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RESEARCH ARTICLE

Occasional photographic records of butterflies (Lepidoptera, Papilionoidea) in Cambodia: 3, Pursat, Siem Reap, Preah Vihear and Stung Treng Provinces in western, north-western and northern Cambodia

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Abstract

The butterfly (Papilionoidea) fauna of Cambodia is very rich but too insufficiently studied. Results are presented of occasional photographic records of butterflies (Lepidoptera, Papilionoidea) made in 2016–2019 (some also in 2006) along with studies on the Odonata fauna in 67 localities of western and northern provinces of Cambodia: Pursat, Siem Reap, Preah Vihear and Stung Treng. This paper completes the two previous communications of this series devoted to the south-western and eastern provinces of this country. In total, 162 identified and 13 provisionally identified species are listed; 22 species (*Miletus ancon*, *Arhopala agrata*, *A. alesia*, *A. allata*, *A. ammonides*, *A. atrax*, *A. aurelia*, *A. moolaiana*, *A. silhetensis*, *Drupadia theda*, *Anthene licates*, *Prosotas aluta*, *Danaus chrysippus*, *Cirrochroa surya*, *Doleschallia bisaltide*, *Athyma ranga*, *Euthalia recta*, *Burara oedipodea*, *Hasora chromus*, *Pseudocoladenia dan*, *Koruthalaios sindu*, *Parnara ganga*) are for the first time reported in literature for Cambodia. These and some problematic species are illustrated. Some misidentifications in the two first communications of the series are made; due to reidentification *Arhopala camdana* and *Borbo cinnara* are for the first time reported for Cambodia in literature.

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Keywords
Fauna, Indochina, photographic records, Preah Vihear Province, Pursat Province, Rhopalocera, Siem Reap Province, Stung Treng Province

Introduction

Butterflies are among the most popular insects because of their spectacular wings and general beauty; they also may serve as an indicator of habitat quality. Nevertheless even in spite of this, the butterfly fauna of Cambodia is still far from well studied, mostly because of the sad events of its history in XX century. One-two decades ago this country was still among the most pristine tropical areas but is currently being deforested at a frightened tempo through Chinese and to some extent South Korean investments. Hence the assessment of its biodiversity is especially important now, as most of the natural habitats will soon be lost irreversibly all over the country.

Recent literature on the butterflies of Cambodia is scarce: a popular atlas of the butterflies of SW Cambodia by Woodfield and Murton (2006), reports of two trips by Hiraoki Onodera (2007, 2008), results of a stationary study of the Phom Samkos Wildlife Sanctuary by Monastyrskii et al. (2011), the first two communications of this series, based on photographic records (Kosterin 2019a, b), a paper devoted to the genus *Hidari* Distant, 1886 (Chartier 2019). Yutaka Inayoshi (2019) has summarised the earlier published faunal information on butterflies of Thailand and Indochina the internet site 'A Check List of Butterflies in Indo-China'. It includes all Cambodian reports up to those by Odonera (2007, 2008), the data by Monastyrskii et al. (2011) are only partly included and further data not yet included. A checklist of Cambodian butterflies at present exists in Internet only (Chartier and Kosterin 2020) and is being permanently updated.

In the absence of regular studies of the butterflies of Cambodia, even preliminary and not too precise data appear useful, like photographs taken in nature and identified thanks to the wing pattern, which is quite informative in butterflies and as a rule exhibits diagnostic characters. Of course there are groups where such identification (especially if only one wing side is available) is difficult or impossible, like in the genera *Jamides* Hübner, [1819], *Nacaduba* Moore, [1881], *Melanitis* Fabricius, 1807, *Mycalesis* Hübner, [1819], *Ypthima* Hübner, [1819], *Potanthus* Scudder, 1872, *Telicota* Scudder, 1872 and many other Hesperiidae.

My trips to Cambodia were focused on dragonflies and damselflies (Odonata) but while studying them I occasionally photographed butterflies and have accumulated quite a number of photographic data. I have already summarised and published those from south-western (Kosterin 2019a) and eastern (Kosterin 2019b) Cambodia. In this third communication of this series I report the photographic data on butterflies from the western (Pursat), north-western (Siem Reap) and northern (Preah Vihear and Stung Treng) provinces of Cambodia, accumulated on six trips made in 2006 (this one only two days long) and 2017–2019.

A considerable amount of data from Siem Reap Province refer to the Phnom Kulen Mts, earlier also studied by Onodera (2007, 2008) in 2006 and 2007. Data from Pursat Province mostly concern the Phnom Tumpor Mt. which was thorougly inversigated in 2006 and 2010 by Monastyrskii et al. (2011) as part of the Phnom Samkos Wildlife Sanctuary.

My data from Pursat Province (2019, with a small addition of 2015) are still very scarce. I planned to update them, as well as to complete those on the Phnom Kulen Mts, with one more trip in 2020 but the well known circumstances made this impossible and I find it useful to complete reporting my up to date existing photographic data on butterflies of Cambodia by this communication. Hopefully their accumulation will be continued in future.

Material and methods

The butterflies were photographed in purely natural conditions without any restriction of their freedom and mobility, using Camedia C8080WZ and Canon EOS 350D cameras, the latter with the lens Sigma AF 24–70 mm F2.8 EX DG MACRO. Coordinates were obtained with Garmine eTrex H personal GPS navigator, revised with Google Earth, and provided, in decimal degree format, as intervals (after the decimal point) of actually examined terrain; elevations were retrieved from Google Earth. The dates are given in the dd.mm.year system.

The taxonomic system mostly follows the site 'A Check List of Butterflies in Indo-China' (Inayoshi 2020), but more subfamilies are recognised. Butterflies were identified using the above mentioned site, some taxonomical (Corbet 1941; Evans 1957; Nakamura 2014) or faunal works concerning Thailand (Ek-Amnuay 2006, with corrigenda by Ek-Amnuay et al. 2007), Cambodia (Onodera 2009; 2008; 2009a), Laos (Onodera 2009, 2015 and his unpublished reports kindly provided by the author), Vietnam (Callaghan 2009) and Borneo (Seki et al. 1991), and the internet resource on the butterflies of Tatai Commune of Koh Kong Province of Cambodia by Gerard Chartier (2020), who also offered enormous help in identification of difficult cases.

Most of the photos were identified to species. Provisional identifications are marked with 'cf'. No subspecies identification was attempted (except for one case), however, most Oriental butterflies have geographically distinct subspecies, so photos were formally attributed to their biogeographically relevant subspecies according to Inayoshi (2020).

Earlier I had uploaded most of photos supporting my two previous communications on Cambodian butterflies (Kosterin 2019a, b) to my internet site (Kosterin 2019c). Now I changed this practice in favour of the Internet portal www.iNaturalist.org, which is easier to handle and includes such an important feature as geolocation. So, all the photographs supporting this communication are available there under the user name @oleg_kosterin, e.g. in the project 'O. 'Kosterin's photos of Cambodian Wildlife' (Kosterin 2020) and can be critically revised. The records

presented here have already been taken into account in the dynamic checklist of butterflies of Cambodia (Chartier and Kosterin 2020).

The following widespread morphological abbreviations were used: FW and HW – fore and hind wing, respectively, UPS and UNS – upperside and underside of both wings, respectively, UPF, UPH, UNF and UNH – upperside of fore and hind wing and underside of fore and hind wing, respectively; the numeration of spaces follows the standard British system in which they are numberred according to the dorsal (lower in the common illustration position) bordering vein (see e.g. Ek-Amnuay 2006).

The area

O'Som vicinities

O'Som (Veal Veng District, Pursat Province) used to be a desolate village situated on very gentle, moderately elevated (400–600 m a.s.l.) sandstone terrain, actually a low plateau, being part of the Cardamom Mts and covered by vast evergreen rainforest. Until the end of 1990s it was one of the last strongholds of Khmer Rouge, so that for long it was hardly accessible by a muddy road crossing the Cardamoms. Everything has changed recently. A good paved road from Koh Kong City to O'Som was constructed to serve several hydropower stations constructed by Chinese firms, with accompanying small towns, tall dams and vast water reservoirs with partly cleared, partly dead forest at lifeless banks. The largest one, some 6×7 km, is situated north of O'Som. The last patches of rainforest were just cut and were still burning when I visited the village in 2019. The area is now occupied by young plantations among burned stumps and trunks of what recently was a vibrant forest. Yet one of the few remaining population of the Siamese Crocodile (*Crocodylus siamensis* Schneider, 1801) still exists at a forested river in not far from O'Som, attracting a lot of tourists. Curiously, the nearly pristine rainforest still exists in most of the more southerly Koh Kong Province, and it is the Pursat Province territory which is dramatically devastated. The scarcely disturbed evergreen forest is retained along the Koh Kong Province border, some 6–13 km S of O'Som, which was a target of my day long trip. The natural conditions there were similar to those in Koh Kong Province described in Kosterin (2019a), with gentle hilly terrain clad with continuous forest, a big rapidous river over a sandstone bed, dark slimy forest brooks and banana plantations under tall trees remained from the forest at its border.

Phnom Tumpor Mt. (mostly after Kosterin 2019d)

Most of the Cardamom Mts are formed by sandstone but there is a massif of two twin, partly joined mountains, Phnom Tumpor (or Phnom Kran; 1557 m a.s.l.) and Phnom Dalai in Veal Veang District of Pursat Province of Cambodia, formed by intrusion of the basalt through sandstone. Both mountains are parts of the Phnom Samkos Wildlife Sanctuary. Both are small basalt plateaux with steep slopes, almost

table mountains, rising to 1100–1300 m a.s.l. over a gentle terrain of ca 300 m a.s.l. where Pramoui and Tumpor villages are situated. Their upper surfaces are also more or less gentle and covered by a peculiar tall and humid "basalt evergreen forest characterised by very tall trees including giant *Ficus*, the genera *Irvingia*, *Syzygium* and *Garcinia*, and various representatives of the Lauraceae" (Monastyrsky et al. 2011: 123), which until now is pristine and untouched on Phnom Tumpor, rarely visited by people, and only slightly disturbed on Phnom Dalai.

At the same time, the steep rocky slopes of these mountains, formed mostly by sandstone, are covered with quite different plant associations: dry low forest or open tree stands, scrub, bamboo thickets and, in their middle zone, by the Tennaserim Pine (*Pinus latteri* Mason) zone on sandstone rocks. In the pine zone on the slopes of both mountains an endemic pitcher plant species occurs, *Nepenthes holdeni* Mey (Mey 2010). All types of the slope vegetation are regularly subject to low-level fires. At the time of my visit the slopes Tumpor were completely dry and largely burnt out without fresh leaves – almost totally at lower elevations, moderately at medium elevations and scarcely at the top. The upper parts of eastern spur crests bore fragments of taller forest, some scrub and tall Poaceae; burnt areas were infrequent. The mountain top surface is a different world of humid, tall and lush forest on a thick soil and slightly undulating terrain. At the time of our visit, the O'Gran Rivulet had a very weak current – in shallow places like a small brook, but actually comprised a chain of the so-called '*anlung*' – deep and broad reaches, connected by short stretches of brook seeping through small stones. Where the O'Gran approaches the mountain slope it flows over a 'staircase' of large rocks and forms two small waterfalls with deep pools beneath and finally fell to the abyss; this rocky part was the only small open area examined.

Thus the upper forested surfaces of both mountains offer a kind of isolated, 'island' habitat, a 'lost world'. In 2000, there still were elephants and tigers on both mountains but both had disappeared from Tumpor by 2006; now the tigers have disappeared from the whole of Cambodia while elephants might still be present on Phnom Dalai (J. Holden pers. comm.).

Phnom Kulen Mts

Phnom Kulen Mts are situated in the northern part of Siem Reap Province and are two twin pear-shaped sandstone plateaux extended from NW to SE and directed by their narrow ends towards each other, with a 1.5 km wide gap between them, through which National Road 67 goes from Siem Reap to Anlong Veng. The NW plateau has the dimensions of 20×11 km, the SE plateau 28×15 km. They have nearly flat, moderately elevated (from ca 200 to 487 m a.s.l.) surfaces but remarkably steep slopes, however the NW plateau has a branchy, lowered but yet rocky western spur. Since the plateaux get at least rare small rains even in the dry season, the natural vegetation of the top surface is evergreen rainforest and that of the slopes is sparse deciduous forest. Both in general appearance and in biogeographical sense Phnom

Kulen is a forest island among vast open landscapes – deforested farmland to the south and open low deciduous forests of *Dipterocarpus intricatus* Dyer to the north. (There is no surprise that Phnom Kulen also served among the last Khmer Rouge strongholds.) The SE Plateau is drained by a considerable river known (more or less changing each other from upstream to downstream) under the names O'Dar, Prey Thom, Chup Preah and Siem Reap. It has a famous tall waterfall being a good butterfly place. There are many smaller rivers and brooks at both plateaux. In the SE part of the SE plateau there are some areas of flat sandstone outcrops with sparse savannah-like vegetation (Khmer '*veal*'), the largest situated to the east of Thmei village. There is a remarkable 'floating forest' at Tnal Mareh terrain, where a branchy stream flows through a swamped forest with trees producing numerous pointed pneumatophores, strongly resembling mangroves. A similar habitat was said to exist also at Tmar Truonh village. However, it is unclear if these habitats are fully natural or formed in the bottoms of the former big water reservoirs after them being destroyed (at least a thousand years ago Tnal Mareh served as a clay quarry for a ceramic factory).

The SE plateau has been being densely inhabited for not less than a thousand years and always was a sacred place. There in 802 Jayavarman II proclaimed the independent Khmer Empire (Kambujadesa) with the capital of Mahendraparvata (the same name being applied to the mountains). In later decades he left it in favour of Hariharalaya at Lake Tonle Sap. Later Phnom Kulen served a source of stone blocks for construction of the famous temples of the Angkorian complex, which were transported from there to the Lake Tonle Sap vicinities via impressive artificial channels. Phnom Kulen harbours remarkable monuments of the pre-Angkorian period: thousands of lingas carved (to provide fertility downstream) in the bottom of the Siem Reap River, the biggest in Cambodia Buddah statue called Preah Ang Thom, two ancient elephants carved from rocks, Damrei Krab and Damrei Sras, and quite a number of pre-Angkorian temple ruins of different state of preservation. At the Rong Chen Archaeological Protected Area a ceramic factory had been launched along with the capital and existed unti it moved to the lowland, so that the ground under the forest is presently full of broken ornamental ceramics. There were not less than four big artificial water reservoirs (Khmer 'baray'): Ta Penh, Tnal Dach (the present name; 'broken dam' in Khmer), Srae Tbong and Tnal Mareh. However, their dams were destroyed by American bombing in the course of the so-called Operation Menu in 1969–1970, so that three of them have no more water and only the dam and reservoir of Tnal Dach was restored in 2012. The traditional land use on the SE Phnom Kulen plateau is 'circle agriculture' (a kind of slash-and-burn agriculture): the forest is cleared and burnt in a rounded territory some 150–200 m in diameter, crops are grown, then the circle is abandoned and re-used each 6–7 years. At present most of the plateau surface, as viewed from above, is a mosaic of adjacent cleared circles separated with narrow borders of remaining forest trees. In 2003 cashew was introduced and since 2008–2009 cashew growing appeared the predominant land use. Only

some areas of pristine forest are still protected, like Preah Thom (Khmer 'big forest') Community Protected Area (ca 5×3 km) at the Preah Ang Thom Buddha and the waterfall. Presently a good paved road is being constructed through the SE plateau, said to serve for construction of a town of luxuriant villas, naturally for Chinese money.

For some reason the NW plateau remains unexplored and undisturbed still being covered with vibrant pristine rainforest. However, the Kbal Spean (Khmer 'head bridge') River in its SE part is famous for the linga carvings in its bottom, even more impressive than those on the SE Plateau. There is a convenient, broad and clean path going uphill through the evergreen forest from the Apsara Foundation checkpoint to Kbal Spean, which offers a great variety of butterflies to observe. The lowering wester spur of this plateau has high impressive rocks but is scarce in water.

Lake Tonle Sap

In its headwaters, the great Mekong River collects a big share of moisture brought by the summer monsoon to the Sino-Tibetan Mountains being the eastern margin of the huge Tibet Plateau. Having left these mountains, the Mekong River flows to the south through southern China, provides the border between Myanmar and Laos, enters Laos, provides the border between Laos and Thailand, re-enters Laos, enters Cambodia and then enters Vietnam where it at last joins the Gulf of Siam of the South Chinese Sea. Being the seventh longest (4,350 km) river in Asia, with the catchment area of 795,000 km^3, it has been carrying a huge amount of sediments which formed the alluvial Cambodian Lowland which once was a bay of the Gulf, so that in its lower reaches Mekong has to pass through its own flat alluvium. This lowland is situated almost at sea level and is so flat that Mekong at its higher levels fails to discharge all its water to the sea. The excess water is therefore redirected and stored in the natural reservoir of Lake Tonle Sap (Khmer 'big lake of fresh water') situated in the centre of the Cambodian Lowland. It is connected with Mekong by the Tonle Sap River which joins it at the city of Phnom Penh, the capital of Cambodia. During the summer monsoon, from May to September, this river flows from Mekong to fill Lake Tonle Sap. When the Mekong level decreases, the current reverses and the water stored in Lake Tonle Sap starts to flow back to Mekong, to be at last discharged to the sea. Hence the Tonle Sap River changes its direction twice a year, approximately in late May-early June and late October-early November, and the Cambodian New Year celebrated on 14–16th of April is associated with its spring turn (although currently takes place somewhat ahead of this). As a result, Lake Tonle Sap cyclically changes its length of 160 km, the area of 2,500 km^2, the volume of 1 km^3, and the average depth of 1 m in May to a length of 250 km, the area of 16,000 km^2, the volume of 80 km^3, and an average depth of 6–9 m in October (Mekong River Commission 2005). The lake is also fed by its NW tributary, the Stung Sangkae (or Sankar) River. Soundings have shown that the lake bottom is perfectly flat without any relief, with the deepest point situating just 2.4 m above sea

level (E. Smith, pers. comm.). In these respects, Tonle Sap is somewhat analogous to the Amazon River or even the epicontinental seas of the Mesosoic. Nevertheless it is fairly young, as formed just 6–8 thousand years ago, that is rather shortly after the Holocene onset, obviously following the increase of humidity at higher latitudes and the volume of the Mekong flow.

Tonle Sap is the largest freshwater lake in Southeast Asia and one of the most productive freshwater ecosystems in the world. Like the Nile in Egypt, this huge fluctuating water body full of fertile sediments has always been the source of living resources, through rice farming and fishing (the latter practiced by Cham rather than Khmer people), for 1.2–1.3 million people populating its banks (but in the fishing season lasting from October to June, their number increases to 1.4–1.6 million). This was a prerequisite of the rise of the famous Angkorian Civilisation in IX century, whose capital was the largest urban centre in the world in XI-XIII centuries. On the flatland surrounding the lake, several embankments go parallel to the water front, so that when the lake shrinks, shallow water (partly supplied also with channels from outside the lake) is retained at their inland side and is subsequently used for watering rice fields at their lake-faced side. As a rule these shallow 'reserves' are covered with thick but low temporarily inundated scrub, but at least a huge area (some 3×2 km) SW of Siem Reap City, bordered by a road embankment going from Phnom Krom village to Sambuor village, is a deeper and permanent lotus/water hyacinth swamp.

The natural vegetation of Lake Tonle Sap banks was the peculiar, temporarily flooded forest composed mostly of *Barringtonia acutangula* (L.) Gaertn., *Dyospiros* sp. and *Terminalia cambodiana* Gagnep. (L. Everaere pers. comm.). This forest has gone from the banks because of human overexploitation lasting for at least one thousand year but remains at the lowermost reaches and the mouth of the Sangkae River, along the southern bank and in certain refugia on the northern bank, e.g. in a popular touristic site of the stilted villages of Kampong Pluk.

However peculiar the Tonle Sap ecosystem is, it is currently far from its pristine state not only because of deforestation, extermination of large animals and overexploitation of natural resources but also, if not mainly, due to the prolonged history of alien species invasion. Thus, large areas of the shallow water surface in inundated forest and scrub is covered by carpets of Water Hyacinth (*Eichhornia crassipes* (Mart.) Solms), the invasive species of the Amazonian origin, which produces enormous biomass and comprises an overwhelming majority of floating vegetation. Among the water hyacinth, rosettes are frequent of the Water Cabbage (*Pistia stratiotes* L.), another species of probably an American origin. The inner zone of seasonably flooded scrub facing the lake bank is largely formed by the 'Giant Sensitive Tree' (*Mimosa pigra* L.), a tall semiaquatic spiny bush of a Mexican origin, and side-by-side with it Giant Cane (*Arundo donax* L.) emerges from water, whose indigenous range probably was in the Mediterranean and Near East, while both are interspersed with floating water hyacinth. Hence most of the bank vegetation below tree level is currently formed by alien species. The actual alteration of the Tonle Sap

ecosystem by invasive species may be much more profound than is noticeable by superficial observations.

There is a furiously debated plan to construct a large hydropower dam across Mekong in Kratie Province. It will regulate Mekong and is expected to stop the Tonle Sap level cycle, thus destroying its unique ecosystem and depriving about million people from living resources.

The vast area between Lake Tonle Sap and Phnom Kulen Mts (37–50 km apart) is a farmland: mostly rice fields, some pastures, secondary growth, a lot of picturesque Palmyra Sugar Palm (*Borassus flabellifer* L.) growing semi-naturally (but having appeared in Cambgodia only ca a thousand years ago). At the same time tall semi-evergreen forest is retained in the territories of the famous temples of the Angkorian complex.

Prey Long Forest

The Cambodian Lowland is a great extension of the lowermost valley of the Mekong River and is filled with its sediments. Once covered by lowland tropical forest, long ago it was mostly cleared and converted into arable land. Presently most of the lowland is almost infinite rice field with scarce trees grown for purpose. Nevertheless, large areas of pristine rainforest have been persisting there until present. The largest of them, among the largest lowland tropical forest in the Old World, Prey Long Forest (or Prey Lang; 'our forest' in the language of local Kuy minority (Turreira-Garcia et al. 2017)) is situated between Lake Tonle Sap and the Mekong River and shared by Preah Vihear (west), Stung Treng (east), Kratie (south-east) and Kampong Thom (south) Provinces. Prey Long Forest extends for ca 73 km both from north to south (ca 12.9–13.6 N) and from west to east (ca 105.3–106.0 E) at elevations 70–170 m a.s.l., occupying 530,000 ha (Turreira-Garcia et al. 2017). It is being furiously logged in Kampong Thom Province, in spite of its status of a wildlife sanctuary. Since lowland wood is cheap to log and transport, persistence of Prey Long Forest was a matter of absence of roads, so that as soon as a road appears the forest is gone. Because of the same absence of roads, it remained totally unexplored scientifically until very recently. Actually it was discovered for science by a 2004 expedition by J. Andrew McDonald (2004).

According to McDonald (2004), the most widespread plant community of Prey Long is (i) primary tall semi-evergreen dipterocarp forest (dominated by *Dipterocarpus*, *Irvingia* and *Syzigium* spp.); other vegetation types occupying less areas are (ii) short semi-evergreen dipterocarp forest, (iii) short deciduous forest (dominated mostly by *Dipterocarpus intricatus*), (iv) tall sralao (*Lagerstroemia* spp.) forests, (v) short riparian and *Melaleuca* forest, (vi) deciduous swamp forest (at Lake Boeng Pes) and (vi) evergreen swamp forest. The water bodies are surprisingly scarce in Prey Long Forest, although it is drained with several small rivers, such as Siembok, Porong, O'Long, Chinit, O'Kachong and O'Ronoul and their smaller tributaries. There are also a small Lake Boeng Pes and some forest swamps locally called

'Cheum' (McDonald 2004). McDonald was the first who discovered and for the first time described the previously unknown peculiar evergreen swamp forest type of the Cambodian Lowland, examined by him (and now me) at the Cheum Takong forest swamp. He prefaced his description as follows: "Over the course of our survey we were able to confirm preliminary reports of extensive, discontinuous evergreen swamp forests in the region. Based on a thorough examination of botanical literature, I can only conclude that this unique vegetation type is exceedingly rare and endemic to the region. Moreover, it is unknown to science." (McDonald 2004: 22).

I examined four sites in the Prey Long northern part as based at Spong village. The village is close to the left bank of a small rivulet of the same name, mostly hidden in vegetation, which serves a border between Preah Vihear Province (left bank) and Stung Treng Province (right bank, with the village). The village is surrounded by clearings of different age, small rice field and young cashew plantations, alternating with forest remnants. The rivulet is mostly hidden in impermeable vegetation as being quite small.

Cheum Takong forest swamp extends for some 3 km from SSW to NNE but only some 400 m wide, being a swamped valley of the O'Long River. It is occupied by a system of many small, shallow anastomosing courses of running water, often entering shallow pools with red, muddy, sucking bottom, forming a kind of 'inner delta' of the river. They abound in upright and pointed pneumatophores of some tree, which made the area strongly resembling mangroves. Cheum Takong is densely overgrown with bush and arboreal vegetation and so is very dark, with few sunlit spots. A large share in vegetation belongs to palms of several species, of which the most abundant is *Licuala* sp., some rattan (*Calamus* sp.) and the conspicuous, tall and elegant *Livistona* sp. At the SE end of Choum Takong there is a small (ca 150 m long) and narrow sunny open area (at which we camped), crossed by an old road and mostly occupied by a swamp with stagnant, turbid water filled with inundated fine grass. A very old, incipiently overgrown but yet sunny, forest road goes along the NW side of Cheum Takong. These grassy swamp, a small glade nearby and the road were sunny places where most butterflies occurred, which were almost absent from the Cheum Takong interiors.

I also briefly examined an already cleared area to the west of Prey Long Forest, mostly supplanted by young plantations, in Chey Saen District of Preah Vihear Province along Road 215, from Chey Saen village to slightly SE of Phneak Roleuk village. This area is crossed by several considerable rivers.

Stung Treng Province, the area west of the Mekong River (mostly after Kosterin 2017)

The region is most a flatland west of the Mekong River, with some sharp hills of tropical karst and a hilly ridge along the Mekong River at the magnificent waterfall of this river, known as Nimith (Nimet) or Labak Koun in Cambodia (at its left bank) and Khon Thai or Khone Pha Pheng (or, separately, Khone Falls and Pha

Pheng Falls) in Laos (occupying the right bank and islands) (Fig. 1). This is the largest waterfall in South-East Asia, formed of a succession of rapids 9.7 km long and 10 km wide.

The land is mostly formed by soils of reddish-brown gravel and occupied by open low deciduous dipterocarp forest mostly formed by *D. intricatus*. This forest still covers most of the area of Thala Barivat and Srae Ruessei Communes, the eastern part of Sam'ang Commune and southern part of Preah Rumkel Commune; alternating with cashew plantations and sporadic rice fields predominating in the rest of the area. The stripe of several hundred meters along new excellent roads is devoid of old trees but abounds in saplings implying fast forest recovery. However, everywhere in this type of forest, numerous charred stumps and logs are scattered indicating regular low fires occurring. This forest is a very picturesque parkland landscape with sparse low but stout trees with very large dark foliage. From distance it seems that the ground is covered with a fresh-green lawn grass. In fact this is thickets of bamboo *Vietnamosasa* sp. ('prech' in Khmer) with very branchy, thin but woody stems and small narrow leaves, which is 1–3.5 m high and hard to penetrate. Some small areas have sandy soils and approach savannah-like veals (Khmer), with lower trees (mostly *D. intricatus*), short and sparse grass, quite a diversity of flowers (mostly gingers) and scattered cycads (*Cycas revoluta* Thunb.). These forests are crossed by many brooks flowing in corridors between 'walls' of the grassy bamboo, with mostly gravel and sometimes rocky beds and slightly turbid, opalescent water. Larger rivulets and rivers are usually hidden in thickets of giant thorny bamboo, also have gravel beds and slightly turbid water.

Smaller areas of tall evergreen or semievergreen forest, resembling that of the Cardamom Mts., are associated mostly with hill slopes. For instance, quite a large area at the road towards Preah Rumkel village is covered with tall evergreen forest; so is the small but sharp hill of Phnom Preahkonkha, with low deciduous forest occupying its northern foothill. As a rule, margins of any patch of evergreen forest is piled by felled and charred trees and is hard to enter.

The Mekong right bank is variable, mostly with a medium-high ground bluff and clayey bed, but also with rock outcrops and sandy patches. The current is considerable downstream of the Nimith Waterfall but soon the river becomes very calm and expands to the so-called Veun Nyang/Anlong Cheuteal pool inhabted by a subpopulation of Irrawady dolphins. In spite of this, there is an active project of Don Sahong Dam across Mekong to be constructed at the Nimeth/Hon Tai Waterfall.

List of localities

The locality data are provided in the geographical order, first of all by provinces. Provinces are denoted with two bold letters. To avoid confusion of numerals, localities are also denoted by conventional nicknames used in this series of papers. These nicknames follow the locality ordinal numbers after back slash, both underlined. To avoid confusion with the previous and forthcoming communications of this series,

and since some localities can hopefully be revisited in future, the numeration continues that of the two previous communications (Kosterin 2019a, b). Disposition of the localities examined is shown in Fig. 1, based on Google Earth.

Pursat Province (*Pu*)

The following localities 97–103 refer to the Cardamom Mts area, either moderately elevated and gentle terrain (locs 97–99 and 103), with evergreen rainforest (locs 97–98) or cleared (locs 99, 103), or a high table mountain of Phnom Tumpor (locs 100–102).

97\12 km S O'Som: the valley and bank of a considerable river in primary evergreen forest, 11–12.5 km SSW of O'Som village, 11.9719°N, 103.1797°E, 413 m a.s.l.

98\9 km S O'Som: a brook in primary evergreen forest, 9 km SSW of O'Som village, 11.9994°N, 103.1883° E, 479 m a.s.l.

99\6 km S O'Som: a brook at the border of a cleared area and evergreen forest, flowing among plantations with some trees left, 6 km SSW of O'Som village, 12.0208°N, 103.1942°E, 529 m a.s.l.

100\O'Gran: Phmon Tumpor Mt. flat top surface, O'Gran brook valley in a tall evergreen forest on basalt, 12.383–385°N, 103.051–053°E, 1185–1192 m a.s.l.

Figure 1. Disposition of localities where butterfly photos considered in this paper were taken in Cambodia. For explanation of numerals see the text. The map base is adopted from Google Earth.

101\O'Gran brink: Phmon Tumpor Mt. O'Gran valley at a waterfall series at its brink at the steep NE slope, 12.3857°N, 103.0542°E, 1163–1180 m a.s.l.

102\Tumpor slope: the crest of Phmon Tumpor Mt. NE slope spur, forest strip on the crest facing dry slopes with low trees and scrub, 12.384°N, 103.064°E, ~940 m a.s.l.

103\Tumpor River: the Tumpor River bank 2.5 km NW of Tumpor village, in a cleared intermontane valley, 12.3895°N, 103.0906°E, 329 m a.s.l.

Siem Reap Province (*SR*)

The following localities 104–120 refer to the Phnom Kulen Mts (two low twin plateaux in the northern Siem Reap Province), where the Angkorian Khmer Empire was proclaimed.

104\Peung Tanon brook: W spur of the western plateau of Phnom Kulen Mts in Phnom Peung Tanon Resort env., an overgrown brook near cassava fields and forest remnants, 120 m, 13.717–719°N, 103.853–855°E, 117–122 m a.s.l.

105\Kbal Spean: the western plateau of Phnom Kulen Mts, Kbal Spean River valley downstream of and at the linga carvings, flowing at a stearcase of sandstone plates in evergreen forest, rather open at the carvings, 13.6846–6860°N, 104.0165–0170°E, 185–192 m a.s.l.

106\upstream of Kbal Spean: the western plateau of Phnom Kulen Mts, the Kbal Spean River valley upstream of the carvings, flowing flat in evergreen forest, 13.686–692°N, 104.013–017°E, 192–212 m a.s.l.

107\Kbal Spean path: the western plateau of Phnom Kulen Mts E slope, the path through evergreen forest from the checkpoint to the Kbal Spean carvings, 13.679–685°N, 104.017–025°E, 77–192 m a.s.l.

108\upstream of carvings: the eastern plateau of Phnom Kulen Mts, the Prey Thom (O'Dar, Siem Reap) River upstream of its reach with linga carvings, evergreen forest (maybe secondary), 750–1400 m SW the waterfall, 650–1000 m W-SW Preah Ang Thom, 13.560–567°N, 104.100–102°E, 290–295 m a.s.l.

109\carvings: the eastern plateau of Phnom Kulen Mts, the Prey Thom (O'Dar, Siem Reap) River reach with linga carved in the bottom, outlining a large (260 × 100 m) open area of sandstone plate, surrounded by evergreen forest, 500–750 m SW the waterfall, 350–650 m W-SW Preah Ang Thom, 13.565–567°N, 104.102–105°E, 280–290 m a.s.l.

110\Kulen Waterfall: the eastern plateau of Phnom Kulen Mts, the well known waterfall on the Prey Thom (O'Dar, Siem Reap) River, 500 m N of Preah Ang Thom: the stony bank of the pool under waterfall, evergreen forest on the valley left slope, small glades and an open trading area above, 13.568–569°N, 104.106–108°E, 270–290 m a.s.l.

111\downstream of Kulen Waterfall: the eastern plateau of Phnom Kulen Mts, the raffly Prey Thom (O'Dar, Siem Reap) River flowing in evergreen forest downstream the waterfall, 500–800 m N–NNE of Preah Ang Thom, 13.569–572°N, 104.108–109°E, 250–270 m a.s.l.

112\2nd bridge: the eastern plateau of Phnom Kulen Mts, the shady right bank of the Prey Thom (O'Dar, Siem Reap) River flowing in evergreen forest remnants between the second bridge and the brook mouth at its left bank, 1.2 km SE of Preah Ang Thom, 13.5542–5548°N, 104.1167–1181°E, 298–300 m a.s.l.

113\Kulen brook: the eastern plateau of Phnom Kulen Mts, an overgrown brook, the left Siem Reap River tributary flowing through evergreen forest remnants and small cashew plantations, 1.2–1.9 km SE of Preah Ang Thom, 13.551–554°N, 104.1167–1200°E, 301–330 m a.s.l.

114\upstream of 2nd bridge: the eastern plateau of Phnom Kulen Mts, the Prey Thom River (O'Dar River, Siem Reap River) ~2 km SE of Preah Ang Thom, 13.5547–5560°N, 104.1211–1266°E, ~300 m a.s.l.

115\veal brook: the eastern plateau of Phnom Kulen Mts, an overgrown brook on a savannah clad sandstone plateau ('*veal*'), 1.5 km SE of Thmei village, 13.523–524°N, 104.119–121°E, 320–326 m a.s.l.

116\Dameri Krab: the eastern plateau of Phnom Kulen Mts, 1 km W of Thmei village, at some ancient ruins near Damrei Krab elephant sculpture among an evergreen forest patch, ~13.535°N, 104.109°E, 330 m a.s.l.

117\to Damrei Sras: the eastern plateau of Phnom Kulen Mts, a forest road ~3 km through an evergreen forest patch SSE of Thmei village, 13.514–518°N, 104.123–124°E, 330–360 m a.s.l.

118\Srae Tbong: the eastern plateau of Phnom Kulen Mts, 1.9 km SW of Anlong Thom village, trees at the E margin of the Srae Tbong former large reservoir now filled with grass inundated by flowing water, 13.5233–5234°N, 104.1580–1583°E, 333–335 m a.s.l.

119\Tnal Mareh: the eastern plateau of Phnom Kulen Mts, 1.3 km SW of Anlong Thom village, Rong Chen Archaeological Protected Area (the Angkorean ceramic factory), Tnal Mareh terrain, evergreen forest and the forest swamped with a branching rivulet, 13.528–530°N, 104.157–160°E, 333–336 m a.s.l.

120\cashew: the eastern plateau of Phnom Kulen Mts, 600 m NW of Anlong Thom village, the O'Dar River flowing among remnants of forest trees through cashew plantations, 13.5412–5417°N, 71 104.1628–1638°E, 325–328 m a.s.l.

121\Anlong Thom: the eastern plateau of Phnom Kulen Mts, 500 m NE of Anlong Thom village, the O'Dar River flowing shallowly over a sandstone bed by a big open savannah-like glade and evergreen forest remnants, 13.541–542°N, 71 104.168–170°E, 336–340 m a.s.l.

122\Tnal Dach: the eastern plateau of Phnom Kulen Mts, 800 m NE of Anlong Thom village, Tnal Dach Reservoir at its dam with tree stand, a cashew plantation below; wet ground at banks, 13.5395–5423°N, 104.1730–1758°E, 344–348 m a.s.l.

123\Tmar Truonh: the eastern plateau of Phnom Kulen Mts, 1.5 km W of Tmar Thruonh village, Srae Tmar Truonh terrain, grassland over flowing water near thickets 13.5383–5385°N, 104.1808–1820°E, 351–353 m a.s.l.

124\Ta Penh: the eastern plateau of Phnom Kulen Mts, 500–600 m N of Ta Penh village, a brook on a pasture and scrub edges. 13,5555–5571°N, 104,2115–2139°E, 365–367 m a.s.l.

The following localities 125–134 refer to flatland between the Phnom Kulen Mts and the great Lake Tonle Sap, which was the home of Angkorian Civilisation

125\Banteay Srei: Banteay Srei village, the Siem Reap River under the bridge (quite fast, with sandy banks with bamboo and other thickets), 2.3 km W of Phnom Diy Hill, 13.5950–5965°N, 103.9613–9623°E, 51–52 m a.s.l.

126\Ben Melaea: Ben Mealea (Beng Melaea) Temple area: dry tall semi-evergreen dipterocarp forest, some small ponds, a moat with a small stream over sandstone rocks, 13.472–479°N, 104.226–230°E, 80–88 m a.s.l.

127\Siem Reap River: 16 km NE of Siem Reap, the Siem Reap River high righ bank downstream of the bridge, with low secondary forest, 13.489–490°N, 103.921°E, 31–32 m a.s.l.

128\SW West Baray: narrow areas of open forest with small long fallow fields at glades and small plantations between the southern part of the western wall and the

western part of the southern wall of the ancient reservoir of West Baray and big lotus swamps, 13.423–436°N, 103.761–765°E, 16–20 m a.s.l., 5.11.2018

129\West Baray: farlmand at the S wall of West Baray at the outlet channel, including its banks; 13.419–424°N, 103.776–787°E, 14–23 m a.s.l.

130\Siem Reap Airport: vasting land with bushes (now built up) easterly of Siem Reap Airport, ~13.405–409°N, 103.817–821°E (coordinates uncertain), 18–20 m a.s.l.

131\Angkor Wat: Angkor Wat Temple territory, open trampled out areas with short grass and patches of tall forest, 13.409–414°N, 103.862–872°E, 24–38 m a.s.l.

132\Banteay Kdel: Angkor temple complex, Banteay Kdel Temple terirtory, tall semi-evergreen forest with a muddy pool. 13.430–431°N, 103.900–901°E, 30–35 m a.s.l.

133\Sra Srang: Angkor temple complex, banks of the Sra Srang basin, 13.429–431°N, 103.903–904°E, 28–32 m a.s.l.

134\Prasat To: 2 km NE Preah Dak village, Prasat To, small pre-Angkorian ruins surrounded with secondary tree stand, 13.456–457°N, 103.955–956°E, 30–31 m a.s.l.

The following localities 135–143 refer to the Lake Tonle Sap N bank and its vicinity

135\to Mukh Paen: Puok District, 10 km SSW of Mukh Paen village, Stung Sangkae River/Lake Tonle Sap floodplain, scrub and trees at a roundish water reserve, 13.396–398°N, 103.564–565°E, ca 7 m a.s.l.

136\Phnom Krom swamp: 3.3 km W of Phnom Krom Hill, am embankment with low trees bordering rice fields and a huge lotus swamp and going from Phnom Krom village to Sambuor village, 13.302–312°N, 103.789–794°E, 10 m a.s.l.

137\Phnom Krom: an old stone quarry at Phnom Krom Hill SE slope, 13.283°N, 103.815°E, 20–30 m a.s.l.

138\Damnak Riverside: Siem Reap, Damnak Riverside Guesthouse (all butterflies were attracted by light), 13.3505°N, 103.8557°E, 20 m a.s.l.

139\Aero Angkor: Siem Reap, a light aircraft base Aero Angkor behind Apollo Plaza, ruderal vegetation at a ditch, 13.3539–3543°N, 103.8996–9000°E, 17 m a.s.l.

140\scrub: 9.5 km of SE Siem Reap, Sangkar Chreav, inundated scrub (water is held by an embankment parallel to the lake bank), 13.291–293°N, 103.9087–9089°E, ~10 m a.s.l.

141\watermelon field: 15 km SE of Siem Reap, Chreav District, a muddy road through inundatable low forest and scrub between a temporal fishing village on an embankment and Lake Tonle Sap N bank, goes through a watermelon field, 13.212–233°N, 103.887–890°E, ~5–9 m a.s.l.

142\Kampong Pluk scrub: flooded (because of an embankment) scrub 7 km NNE of Kampong Pluk village, 13.273–275°N, 103.987–992°E, ~10 m a.s.l.

143\Kampong Pluk forest: tall temporarily flooding forest between Kampong Pluk village env. and Lake Tonle Sap N bank and its margin at the Roluos Canal right bank, 13.197–201°N, 103.974–975°E, ~5–9 m a.s.l.

Preah Vihear Province (*PV*)

144\Tbeng Meancheay: Tbeng Meancheay Mt. N foot, margin of virgin evergreen forest of the steep N slope, 12 km WSW Tbeng Meanchay City, 13.7771°N, 104.8703°E, ~140 m a.s.l.

145\Chey Saen: 3.6 km SE of Chey Saen village, a small river shaded by strips of trees and spiny bamboo, flowing across short open deciduous dipterocarp forest with some rice fields. 13.6243–6247°N, 105.2844–2851°E, 63 m a.s.l.

146\Phneak Roleuk: Chey Saen District, Thmea Commune, Phneak Roleuk village S environs up to the river 3 km SE of it; tall forest remnants, recently cleared areas, young plantations, small rice fields, 13.582–528°N, 105.475–482°E, 130–135 m a.s.l.

147\SE Phneak Roleuk: Chey Saen District, Thmea Commune, 3–4.5 km SE of Phneak Roleuk village, tall forest remants, fresh clearings, small rice fields, 13.482–497°N, 105.482–483°E, 127–134 m a.s.l.

The following localities 148–151, although situated in two different provinces, refer to the vast and so far only slighly disturbed lowland rainforest Prey Long

148\Cheum Thom: 5.2 km W of Spong village, a road passing a big grassy swamp Cheum Thom among tall semievergreen forest, 13.454–456°N, 105.495–497°E, 117 m a.s.l.

149\Spong Rivulet: 1.3 km SW of Spong village, tall semievergreen forest margin of a big glade used for pasturing cattle at the Spong Rivulet righ bank, 13.447–449°N, 105.533–535°E, 123–124 m a.s.l.

Stung Treng Province (*ST*)

150\Spong: 1–2 km SW of Spong village, remnants of tall semievergreen forest alternating with rice fields and young plantations, two muddy roadside pools, 13.447–449°N, 105.533–535°E, 123–124 m a.s.l.

151\Cheum Takong: 15 km SE of Spong village, margins of Cheum Takong forest swamp (with thick evergreen swamp forest) at the O'Long River course: an open grassy shallow swamp, a weak abandoned road along the margin and a tiny glade, 13.323–339°N, 105.607–614°E, 132 m.

The following localities 152–163 refer to the areas adjacent to the Mekong right bank, mostly occupied by moderately disturbed short open deciduous grassy forests of *D. itricatus*, with some patches of tall evergreen forest.

152\Anlung Chhrey: Anlung Chhrey Commune, 10 km NNE of Anlung Chhrey village, a river valley with secondary vegetation (the banks partly covered by ruderal *Mimosa pudica*, partly by small banana plantations, partly by forest remnants; partly by open grassy area with open dipterocarp saplings), 13.756–762°N, 105.639–645°E, 119–150 m a.s.l.

153\Karst hill: Sam'ang Commune, 9 km NWW of Sam'ang village, small remnants of tall evergreen forest being cut and replaced by cashew plantations at a northern foot of a picturesque limestone karst outcrop. 13.743–748°N, 105.741–744°E, 120–127 m a.s.l.

154\grassy brook: a brook flowing among tall grassy *Vietnamosasa* thickets and open deciduous dipterocarp forest 9.5 km NWW of Stung Treng, 6.5 km W of Thala Barivat, 13.5469–5478°N, 105.8836–8842°E, 84–86 m a.s.l.

155\Thala Barivat: quite a big river crossing a populated area, with high bluffs, surrounded by tall spiny bamboo thickets, 9 km NNW of Stung Treng, 5 km NNW of Thala Barivat, 13.5508–5511°N, 105.9322–9328°E, 62–63 m a.s.l.

156\Srae Ruessei: a rivulet overgrown with *prech* (*Vietnamosasa* sp.) forming 'walls' about a men height, winding among a sparce low deciduous dipterocarp stand with the grassy layer formed by the same low bamboo or, on areas with more sandy soil, of sparcer and lower herbage of the '*veal*' type, with many flowering gingers and presence of cycads, 9 km NNW of Stung Treng, 0–0.5 km NE of Srae Ruessei village, 13.595–504°N, 105.930–931°E, 64–67 m a.s.l.

157\spiny bamboo river: a river flowing among spiny bamboo groves with admixture of few trees at banks, 13 km NW of Stung Treng, 3 km NNW of Srae Ruessei village, 13.623–626°N, 105.913–914°E, 68–71 m a.s.l.

158\evergreen forest rivulet: 25.5 km NNW of Stung Treng, 4.7 km E of Sam'ang village, a rivulet in a considerable evergreen forest patch, 13.731–735°N, 105.866–971°E; 93–95 m a.s.l.

159\open forest brook: a brook flowing through sandstone plates among a tall grassy (*Vietnamosasa* sp.) open deciduous dipterocarp forest, 32.5 km NNW of Stung Treng, 9.5 km NE of Sam'ang village, 13.798–800°N, 105.860–865°E, 81–85 m a.s.l.

160\O'Ta Lao: banks, with secondary forest (bamboo thickets and trees, further inland open low deciduous dipterocarp forest), of the big O'Ta Lao River. 34 km NNW of Stung Treng, 12 km SW of Preah Rumkel village, 13.817–819°N 105.876–879°E, 72–82 m a.s.l.

161\Anlung Chheuteal: groves (high bamboo and trees, with glades with fresh grass, ferns and winding plants) above the right bank of the big Mekong River broadening 7 km SE of the great Nimeth Waterfall, the Dolphin Viewpoint in Anlung Chheuteal village. 13.926–929°N, 105.949–951°E, 58–61 m a.s.l.

162\Phnom Preahkonkha: 2 km SWW of Nimeth Waterfall, a grassy open short deciduous dipterocarp forest at a foot of the acute hill of Phnom Preahkonkha covered with evergreen rainforest, 13.940–946°N 105.864–867°E, 140–165 m a.s.l.

163\Kampong Preah: a brook at a crossroad where the road to Nimeth Waterfall branches from the road Stung Treng - Kampong Sralau, low deciduous dipterocarp parkland, with either *prech* (*Vietnamosasa* sp.), not so tall as elsewhere, or short *veal* vegetation with many flowers, 2 km SW of Kampong Preah village, 14 km NW of Preah Rumkel village, 13.952–956°N, 105.844–847°E, 92–97 m a.s.l.

For more information about some of the localities examined, including the landscape photos, see my odonatological papers, as follows: for O'Som vicinity in 2015 see (Kosterin, 2015), for Stung Treng Province in 2016 see (Kosterin, 2017), for Phnom Tumpor Mt. in 2019 see (Kosterin, 2019d); more such papers devoted to other areas/years to be published.

Results

The list of butterfly species identified by photos is given below as accompanied with localities, dates and, where possible, sex. For some species a short comment is added. The taxa for the first time reported for Cambodia in scientific literature are marked with asterisk (*). These records, as well as some problematic ones, are illus-

trated by photographs taken in nature. Rarity of taxa in the neighbouring Thailand is indicated according to Ek-Amnuay (2006) as §, §§, §§§ from common to rare.

Papilionidae

Troidinae

Pachliopta aristolochiae goniopeltis (Rotschild, 1908) §. SR: ♂, ♀, 128\SW West Baray, 5.11.2018.

Troides aeacus aeacus (C. & R. Felder, 1865) §. SR: ♂, 128\SW West Baray, 5.11.2018.

Papilioninae

Graphium agamemnon agamemnon (Linnaeus, 1758) §. SR: ♂, 105\Kbal Spean, 6.11.2018; PV: ♂, 150\Spong, 7.12.2019.

Graphium antiphates pompilius (Farbicius, 1787) §. SR: 2 ♂♂, 125\Banteay Srei, 1.07.2018.

Graphium arycles sphinx (Fruhstorfer, 1899) §. SR: 2 ♂♂, 105\Kbal Spean, 6.11.2018; ♂, 111\downstream of Kulen Waterfall, 30.06.2018; ♂, 112\2nd bridge, 4.11.2018; ♂, the same place, 4.11.2018; ♀, 135\to Mukh Paen, 3.12.2006.

Graphium doson axion (C. et R. Felder, 1864) §. SR: 9 ♂♂, 111\downstream of Kulen Waterfall, 30.06.2018; ♂, 112\2nd bridge, 4.11.2018; 132\Banteay Kdel, 22.02.2017.

Graphium sarpedon sarpedon (Linnaeus, 1758) §. Pu: ♂♂, 99\6 km S O'Som, 24.03.2015. SR: ♂, 105\Kbal Spean, 14.06.2018; ♂, 111\downstream of Kulen Waterfall, 30.06.2018.

Lamproptera meges annamiticus (Fruhstorfer, 1909) §. SR: 105\Kbal Spean, 6.11.2018; PV: 2 ♂♂, 148\Cheum Thom, 8.12.2019; 149\Spong Rivulet, 7.12.2019; ST: ♂, 150\Spong, 7.12.2019.

Papilio mahadeva Moore, [1879] §§. SR: ♂, 105\Kbal Spean, 14.06.2018; ♂, 111\downstream of Kulen Waterfall, 30.06.2018.

Papilio clytia clytia (Linnaeus, 1758) §. Pu: ♂, f. *onape* (Moore, 1979), 103\Tumpor River, 14.03.2019. SR: ♂, f. *dissimilima*, 122\Tnal Dach, 29.11.2019; ♀, f. *onape* (Moore, 1979), 134\Prasat To, 21.02.2017.

Papilio demoleus malayanus Wallace, 1865 §. SR: ♂, 112\2nd bridge, 4.11.2018; 122\Tnal Dach, 29.11.2019; 128\SW West Baray, 14.12.2019. ST: ♂, 150\Spong, 7.12.2019.

Papilio memnon agenor Linnaeus, 1758 §. SR: 2 ♂♂, 105\Kbal Spean, 14.06.2018; ♂, 108\upstream of carvings, 23.02.2017; ♂, 111\downstream of Kulen Waterfall, 30.06.2018.

Papilio nephelus chaon Westwood, 1845 §. SR: 11 ♂♂, 105\Kbal Spean, 14.06.2018; ♂, 110\Kulen Waterfall, 12.06.2018; 22 ♂♂, 111\downstream of Kulen Waterfall, 30.06.2018.

Papilio polytes romulus Cramer, [1775] §. SR: 3 ♂♂, 105\Kbal Spean, 14.06.2018; ♂, ♀, 109\carvings, 11.06.2018; 2 ♂♂, 111\downstream of Kulen Waterfall, 30.06.2018; ♂, 112\2nd bridge, 4.11.2018; ♀ f. *polytes*, 128\SW West Baray, 14.12.2019; ♂, 129\West Baray, 8.01.2006.

Pieridae

Pierinae

Appias albina darada (Felder et Felder, [1865]) §. SR: ♀, 105\Kbal Spean, 14.06.2018; ♀, 143\Kampong Pluk forest, 15.06.2018. ST: 2 ♂♂, 153\Karst hill, 26.07.2016.

Appias lyncida eleonora (Boisduval, 1836) §. SR: ♂, 105\Kbal Spean, 6.11.2018; ♂, 111\downstream of Kulen Waterfall, 30.06.2018; ♂, 112\2nd bridge, 30.06.2018; 2 ♂♂, ♀, 122\Tnal Dach, 29.12.2019; 2 ♂♂, 123\Tmar Truonh, 29.11.2019; 2 ♂♂, 128\SW West Baray, 13.12.2019; ♀, the same place, 14.12.2019; ♂, 141\watermelon field, 13.06.2018; ♀, 143\Kampong Pluk forest, 15.06.2018.

Appias olferna olferna Swinhoe,1890 §. SR: 2 ♂♂, 121\Anlong Thom, 10.03.2019; 2 ♂♂, 123\Tmar Truonh, 29.11.2019; ♀, 128\SW West Baray, 13.12.2019; ♂, the same place, 14.12.2019; ♂, 141\watermelon field, 12.12.2006.

Cepora iudith lea (Doubleday,1846) §. SR: 2 ind., 105\Kbal Spean, 14.06.2018; ST: ♂, 150\Spong, 7.12.2019.

Cepora nerissa dapha (Moore,[1879]) §. SR: ♀, 105\Kbal Spean, 14.06.2018; ♀, 128\SW West Baray, 14.12.2019. PV: ♀, 149\Spong Rivulet, 7.12.2019.

Delias hyparete indica (Wallace, 1867) §. SR: ♂, 135\to Mukh Paen, 13.12.2019; ♂, 143\Kampong Pluk forest, 15.06.2018.

Hebomoia glaucippe glaucippe (Linnaeus, 1758) §. SR: 105\Kbal Spean, 14.06.2018.
Ixias pyrene verna Druce, 1874 §. SR: 4 ♂♂, 105\Kbal Spean, 14.06.2018; ♀, 128\SW West Baray, 14.12.2019.

Leptosia nina nina (Fabricius, 1793) §. SR: 128\SW West Baray, 14.12.2019; PV: 151\Cheum Takong, 6.12.2019.

Pareronia anais anais Lesson, 1837 §. SR: ♀, 128\SW West Baray, 5.11.2018; ♂, ♀, the same place, 13.12.2019; ♂♂, ♀♀, the same place, 14.12.2019; ♂, 129\West Baray, 8.01.2006. PV: ♂, 149\Spong Rivulet, 7.12.2019.

Prioneris philomone clemanthe (Doubleday, 1846) §§. Pu: ♂, 99\6 km SW O'Som, 24.03.2015.

Coliadinae

Catopsilia pomona pomona (Fabricius, 1775) §. SR: ♂, ♀ f. *crocale*, 128\SW West Baray, 14.12.2019; ♂, 114\upstream of 2nd bridge, 30.11.2019. ST: ♂, 150\Spong, 7.12.2019; ♂, Carst hill, 26.07.2016; ST: ♀ f. *crocale*, 156\Srae Ruessei, 28.07.21.

Catopsilia pyranthe pyranthe (Linnaeus, 1758) §. SR: ♂, 129\West Baray, 8.01.2006.

Eurema cf. *andersoni sadanobui* Shirozu & Yata,1982 §§. SR: 9 ♂♂, 105\Kbal Spean, 14.06.2018 (Fig. 2); 128\SW West Baray, 14.12.2019 (Fig. 3). The idantification is based on the following diagnostic characters: on UNF, there is only one but well expressed spot in the cell, the cell-end spot is produced below, no broad brown apical brand; the HW outer margin is rounded without a trace of angulation.

Eurema brigitta hainana (Moore,1878) §§. PV: 145\Chey Saen, 21.06.2018.

Eurema hecabe hecabe (Linnaeus, 1758) §. SR: ♂, ♀, 1 more ind., 128\SW West Baray, 13.12.2019. PV: ♂, ♀, 146\Phneak Roleuk, 21.06.2018; ST: ♂♂, 150\Spong, 7.12.2019; 151\Cheum Takong, 6.12.2019; 153\Karst hill, 26.07.2016.

Figures 2–4. *Eurema* spp.: **2–3** – *E.* cf. *andersoni sadanobui* from 105\Kbal Spean, 14.06.2018 (**2**) and 128\SW West Baray, 14.12.2019 (**3**); **4** – *Eurema* sp. from 146\Phneak Roleuk, 21.06.2018. Not to scale.

Eurema sp. PL: 146\Phneak Roleuk, 21.06.2018 (Fig. 4). The black UPF pattern seen through, with a narrow projection of pale in space 3 following the projection of black along vein 3 (with the situation in space 4 obscured by HW) does not fit any species. The straight inner margin of the UPF black border above vein 3 (Fig. 4) is found in *E. brigitta* and *E. laeta* (Boisduval, 1836). The former has no extention of yellow in space 3 while the latter has pointed FW and angled HW.

Gandaca harina burmana Moore, 1906 §. SR: 9 ♂♂, 105\Kbal Spean, 14.06.2018; ♂, the same place, 6.11.2018; 128\SW West Baray, 14.12.2019.

Lycaenidae

Curetinae

Curetis saronis indosinica Fruhstorfer, 1908. SR: ♂, 135\to Mukh Paen, 13.12.2006; ♀, 142\Kampong Pluk scrub, 2.11.2018.

Mileninae

Allotinus cf. *unicolor rekkia* Riley et Godfrey. 1921 §§. Pu: ♂ (Fig. 5), 98\9 km S O'Som, 21.03.2019. The UNH spots in spaces 4 and 5 are unusually large. (Perhaps A. *taras* (Doherty, 1889) is another plausible option for identification, see Inayoshi, 2020).

**Miletus ancon siamensis* (Godfrey, 1916) §§§. SR: ♀ (Fig. 6), 113\Kulen brook (at a small cashew plantation), 30.06.2018.

Miletus chinensis learchus C. & R. Felder, 1862 §. SR: ♂, 122\Tnal Dach, 29.11.2019; ♂, 124\Ta Penh, 10.03.2019.

Poritiinae

Poritia cf. *hewitsoni tavoyana* Doherty, 1889 §§. ST: ♂ (Figs 7–8), 151\Cheum Takong (a small glade), 6.12.2019. The UPS glittery ground colour is almost neutrally deep blue and has too scarce greenish hue as compared to typical representatives of this species and somewhat approaches that in *Poritia erycinoides elsiei* (Felder et Felder, 1865). This situation is opposite to the male reported, also as *P. hewitsoni tavoyana*, in the previous communication (Kosterin 2019b) from Mondulkiri Province, in which the UPS ground colour well fitted *P. hewitsoni* while the black pattern (with two black spots in space 1b) fitted more *P. erycinoides* (Kosterin 2019b: figs. 8–9).

Figures 5–19. Some Lycaenidae from W, NW and N Cambodia: **5** – *Allotinus* cf. *unicolor rekkia*, ♂, from 98\9 km S O'Som, 21.03.2019; **6** – *Miletus ancon siamensis*, ♀, from 113\Kulen brook, 30.06.2018; **7–8** – *Poritia* cf. *hewitsoni tavoyana*, ♂, from 151\Cheum Takong, 6.12.2019; **9** – *Drupadia theda fabricii*, ♀, from the same place (151\Cheum Takong, 6.12.2019); **10–11** – *Rapala* cf. *dieneces*, ♀♀, from 149\Spong Rivulet, 7.12.2019 (**10**) and 151\Cheum Takong, 6.12.2019 (**11**); **12** – *Anthene licates dusuntua*, ♂, from 122\Tnal Dach, 29.11.2019; **13–15** – *Prosotas aluta* ssp. from 136\Phnom Krom swamp, 18.06.2018 (**13–14**) and 142\Kampong Pluk scrub, 2.11.2018 (**15**); **16–19** – *Prosotas nora ardates* (**16**) and *Prosotas* sp., probably the same species (**17–19**) from 151\Cheum Takong, 5 (**19**)–6 (**17–18**).12.2019. Not to scale.

Theclinae

Amblypodia anita anita Hewiston, 1862 §§. SR: 3 ♀♀, 1 sex uncertain, 128\SW West Baray, 14.12.2019; ♀, 129\West Baray, 8.01.2006. PV: ♀, 146\Phneak Roleuk, 21.06.2018. ST: ♀, 156\Srae Ruessei, 28.07.2016; ♀, 154\grassy grook, 29.03.2016.

**Arhopala agrata binghami* Corbet, 1946 §§§. Pu: ♂ (Fig. 20), ♀ (Figs 21–22), 97\12 km S O'Som, 21.03.2019.

Arhopala aida aida de Nicéville, 1889 §§. SR: 108\upstream of carvings, 23.02.2017.

**Arhopala alesia sacharja* Fruhstorfer, 1914 §§§. PV: 149\Spong Rivulet, 7.12.2019 (Fig. 23).

Arhopala alitaeus mirabella Corbet, 1941 §§§. SR: 109\carvings, 23.02.2017 (photo by N. Priydak). ST: 158\evergreen forest rivulet, 29.07.2016.

**Arhopala allata atarana* (Tytler, 1926) §§§. SR: 106\upstream of Kbal Spean, 14.06.2018 (Fig. 24). A very bad photo, but the UNH postdiscal spots in spaces 6 and 7 are in echelone (and of a peculiar shape), small but darker spots in the basal area versus the indistinct others, a pinkish UNS tint and a pointed FW with a straight postdiscal band (Fig. 24) narrow the choise to this only option.

**Arhopala ammonides ammonides* (Doherty, 1891) §§§. Pu: 97\12 km S O'Som, 21.03.2019 (Figs 25–26).

Arhopala anthelus (Westwood, 1852) ssp. §§. SR: ♀, 112\2nd bridge, 30.06.2018; ST: 151\Cheum Takong, 6.12.2019.

Arhopala atosia jahara Corbet, 1941 §. Pu: 97\12 km S O'Som, 21.03.2019.

**Arhopala atrax* (Hewitson, 1862) §§§. PV: 149\Spong Rivulet, 7.12.2019 (Fig. 27).

**Arhopala aurelia* de Nicéville, [1896] §§. SR: ♂ (Fig. 27), 113\Kulen brook, 10.03.2019. Identification is based on such characters unlike those in few similar species as the produced UPS, a cold hue of UNS, disposition of the UNH postdiscal spots in spaces 3 and 4 and broad dark UNH submarginal spots.

Arhopala centaurus nakula (C. & R. Felder, 1860) §. SR: 109\carvings, 23.02.2017; 115\veal brook, 30.06.2018; 120\cashew, 10.03.2019; 122\Tnal Dach, 28.11.2019; 140\scrub, 5.11.2018; 141\watermelon field, 13.06.2018; 143\Kampong Pluk forest, 15.06.2018; ST: 150\Spong, 7.12.2019.

Arhopala elopura Druce, 1794 ssp. §§. SR: 3 ind. (Figs 32–34, probably 1 ♂, 2 ♀♀), 106\upstream of Kbal Spean, 14.06.2018; PV: 148\Cheum Thom, 8.12.2019 (Fig. 35). ST: ♂ (Figs 36–37), ♀ (Figs 38–40), 151\Cheum Takong, 6.12.2019; 2 ind. (Figs 40–41), 158\evergreen forest rivulet, 29.07.2016. Y. Inayoshi (2020) attributes continental Indochinese specimens of *A. elopura* to an undescribed subspecies, which is shown as having no or hardly noticeable UNF subcostal spot at middle of space 11 above the cell central spot. This spot is absent from the Cheum Thopm (Fig. 35) and Cheum Takong (Figs 36, 38) specimens but is well expressed in the Kbal Spean (Figs

Figures 20–31. *Arhopala* spp. from W, NW and N Cambodia: **20–22** – *Arhopala agrata binghami*, ♂ (**20**), ♀ (**21–22**), from 97\12 km S O'Som, 21.03.2019; **23** – *Arhopala alesia sacharja*, from 149\Spong Rivulet, 7.12.2019; **24** – *Arhopala allata atarana*, from 106\upstream of Kbal Spean, 14.06.2018; **25–26** – *Arhopala ammonides ammonides* from 97\12 km S O'Som, 21.03.2019; **27** – *Arhopala atrax*, from 149\Spong Rivulet, 7.12.2019; **28** – *Arhopala aurelia*, ♂, from 113\Kulen brook, 10.03.2019; **29–30** – *Arhopala moolaiana maya*, ♂, from 97\12 km S O'Som, 21.03.2019; **31** – *Arhopala silhetensis silhetensis* from 113\Kulen brook. Not to scale.

Figures 32–41. *Arhopala elopura* ssp. from NW and N Cambodia: **32–34** – (probably 1 ♂, 2 ♀♀) from 106\upstream of Kbal Spean; **35** –from 148\Cheum Thom, 8.12.2019; **36–37** – ♀ from 151\Cheum Takong, 6.12.2019; **38–39** –♀ from the same place (151\Cheum Takong, 6.12.2019); **40–41** –two different individuals from 158\evergreen forest rivulet, 29.07.2016. Not to scale.

32–41) and Stung Treng (Figs 40–41) specimens, as in the peninsular *A. elopura dama* or *A. aida* (Seki et al. 1991).

**Arhopala moolaiana maya* (Evans, 1932) §§. Pu: ♂ (Figs 29–30), 97\12 km S O'Som, 21.03.2019. The UNH postdiscal band is completely dislocated at vein 2 (Figs 29–30) that does not fit this species according to the keys by Corbet (1941), Evans (1957) and Seki et al. (1991) (which obviously 'inherited' many points from earlier to later ones), formal application of which would lead to failure in identifying these photos.

But if to follow the option that the band is only partly' dislocated then these keys would lead to *A. moolaiana*. My photos (in which a bit of UPS is fortunately seen) (Figs 29–30) fit perfectly the specimens of this species and subspecies shown by Ek-Anmuay (2006) and Inayoshi (2020), in which UNH postdiscal band can also be considered as completely dislocated at vein 2.

Arhopala perimuta perimuta (Moore, 1858) §§§. SR: 112\2nd bridge, 10.03.2019.

**Arhopala silhetensis silhetensis* (Hewitson, 1862) §. SR: 113\Kulen brook, 17.06.2018 (Fig. 31).

Cheritra freja evansi Cowan, 1965 §. SR: 109\carvings, 11.06.2018; 128\SW West Baray, 1.11.2018; 136\Phnom Krom swamp, 7.12.2019; 143\Kampong Pluk forest, 15.06.2018. ST: 151\Cheum Takong, 6.12.2019.

Cigaritis lohita himalayana (Moore, 1884) §. SR: 136\Phnom Krom swamp, 18.06.2018; PV: 149\Spong Rivulet, 7.12.2019. ST: ♀, 163\Kampong Preah, 1.08.2016.

Cigaritis syama peguanus (Moore, 1884) §. SR: 118\Srae Tbong, 28.11.2019; PV: 146\Phneak Roleuk, 21.06.2018; ♂, 147\SE Phneak Roleuk, 21.06.2018. ST: 2 ♂♂, 1 sex uncertain, 156\Srae Ruessei, 28.07.2016.

**Drupadia theda fabricii* Moore, 1884 §§. ST: ♀ (Fig. 9), 151\Cheum Takong (on a glade), 6.12.2019.

Hypolycaena amasa amasa (Hewiston, [1865]) §§. SR: 104\Peung Tanon brook, 11.12.2019; 105\Kbal Spean, 14.06.2018; the same place, 6.11.2018; 107\Kbal Spean path, 14.06.2018. PV: 150\Spong, 7.12.2019.

Hypolycaena erylus himavantus Fruhstorfer, 1912 §. SR: ♂, 104\Peung Tanon brook, 11.12.2019; ♂, 107\Kbal Spean path, 6.11.2018; 122\Tnal Dach, 29.11.2019; ♂, 128\SW West Baray, 1.11.2018; ♂, ♀, 135\to Mukh Paen, 3.12.2006; ♂, 143\Kampong Pluk forest, 15.06.2018. ST: ♀, 163\Kampong Preah, 1.08.2016.

Loxura atymnus continentalis Fruhstorfer, [1912]) §. SR: 104\Peung Tanon brook, 11.12.2019; 119\Tnal Mareh, 29.11.2019.

Neomyrina hiemalis (Distant et Salvin, 1878) (= *N. nivea hiemalis* auct.) §§§. **SR**: 121\Anlong Thom, 10.03.2019; 122\Tnal Dach, 28.11.2019.

Rapala cf. *dieneces* (Hewitson, [1878]) §§§. PV: ♀ (Fig. 10), 149\Spong Rivulet, 7.12.2019; ST: ♀ (Fig. 11), 151\Cheum Takong, 6.12.2019.

Rapala iarbus (Fabricius,1787) §. SR: ♂, 128\SW West Baray, 13.12.2019.

Rapala manea schistacea (Moore, 1879) §§. SR: ♀, 122\Tnal Dach, 28.11.2019.

Yasoda tripunctata tripunctata (Hewiston, 1863) §§. SR: ♀, 113\Kulen brook, 30.06.2018.

Polyommatinae

Acytolepis puspa gisca (Fruhstorfer, 1910) §. SR: 105\Kbal Spean, 14.06.2018; 2 ♂♂, the same place, 6.11.2018; 114\upstream of 2nd bridge, 4.11.2018; ST: ♂, 150\Spong, 7.12.2019.

Anthene emolus emolus (Godart, 1824) §. SR: 106\upstream of Kbal Spean, 14.06.2018; ♂, the same place, 6.11.2018; ♂, 110\Kulen Waterfall, 30.06.2018; 112\2nd bridge, 11.03.2019; ♀, 118\Srae Tbong, 28.11.2019; 121\Anlong Thom, 29.11.2019; ♀, 122\Tnal Dach, 28.11.2019; the same place, 29.11,2019; ♂, ♀, 135\to Mukh Paen, 3.12.2006; 1 ind., the same place, 13.12.2019. PV: ♂, 148\Cheum Thom, 8.12.2019; ST: ♂, 151\Cheum Takong, 6.12.2019.

**Anthene licates dusuntua* Corbet, 1940 §§§. SR: ♂ (Fig. 12), 122\Tnal Dach, 29.11.2019.

Caleta elna noliteia Fruhstorfer, 1918 §§. SR: 107\Kbal Spean path, 14.06.2018.

Caleta roxus roxana (de Niceville, 1897) §§. SR: 105\Kbal Spean, 14.06.2018; 3 ♂♂, the same place, 6.11.2018; 107\Kbal Spean path, 14.06.2018.

Castalius rosimon rosimon (Fabricius, 1775) §. SR: 114\upstream of 2nd bridge, 30.11.2019; 122\Tnal Dach, 28.11.2019; ♂, ♀, 128\SW West Baray, 5.11.2018; ♂, ♀, the same place, 13.12.2019. PL: 149\Spong Rivulet, 7.12.2019; ♂, 150\Spong, 7.12.2019; 151\Cheum Takong, 6.12.2019.

Catochrysops panormus exiguus (Distant, 1886) §§. ST: ♂, 150\Spong, 7.12.2019.

Catochrysops strabo strabo (Fabricius, 1793) §§. Pu: 3 ♂♂, 97\12 km S O'Som, 21.03.2019. SR: ♂♂, 122\Tnal Dach, 29.11.2019; ST: 2 ♂♂, 150\Spong, 7.12.2019.

Chilades pandava pandava (Horsfield, [1829]) §. SR: ♂♂, 122\Tnal Dach, 29.11.2019. ST: ♂, 154\grassy brook, 29.03.2016; ♂, 156\Srae Ruessei, 28.07.2016; 158\evergreen forest rivulet, 29.07.2016; ♀, 161\Anlung Chheuteal, 31.07.2016.

Discolampa ethion ethion (Fabricius, 1775) §§. SR: 2 ind., 105\Kbal Spean, 14.06.2018; 128\SW West Baray, 14.12.2019.

Euchrysops cnejus cnejus (Fabricius, 1758) §. SR: 130\Siem Reap Airport, 9.01.2006.

Jamides cf. *celeno aelianus* (Fabricius, 1793) §. SR: ♂, 128\SW West Baray, 5.11.2018; PV: 2 ♂♂, 3 ♀♀, 149\Spong Rivulet, 7.12.2019; ST: ♂, 150\Spong, 7.12.2019; ♀, 151\Cheum Takong, 6.12.2019.

Megisba malaya sikkima Moore, 1884 §§. SR: ♂, 107\Kbal Spean path, 14.06.2018.

Neopithecops zalmora zalmora (Butler,[1870]) §§. SR: 108\upstream of carvings, 23.02.2017; 122\Tnal Dach, 29.11.2019; ♂, 3 ♀, 128\SW West Baray, 5.11.2018. PV: ♀, 144\Tbeng Meancheay, 19.06.2018.

Pithecops corvus correctus Cowan, 1966 §§. Pu: 100\O'Gran, 17.03.2019.

**Prosotas aluta* (H.Druce, 1783) ssp. §. SR: a tandem (Figs 13–14), 136\Phnom Krom swamp, 18.06.2018; a tandem (Figs 15), 142\Kampong Pluk scrub, 2.11.2018. Found only at temporary flooded scrub at Lake Tonle Sap bank. This species is considered to be represented by a number of subspecies, of which *P. aluta coelestis* (Wood-Mason et de Nicéville, [1887]) ranges in India, Ceylon, S Yunnan, mainland Thailand, Laos and southern Vietnam (Ek-Amnuay 2007; Inayoshi 2020). It strongly (tempting to suggest non-conspecificity) differs from the nominotypical *P. aluta aluta* from Borneo (Seki et al. 1999), as well as from *P. aluta nanda* (de Nicéville, 1895) known from Sumatra and Malay Peninsula including the peninsular Thailand (Ek-Amnuay 2007; Inayoshi 2020), by very contrasted UNS, with a big blackish UNH postdiscal brand in spaces 4 and 5 contacting the cell-end bar (Ek-Amnuay 2007). The Cambodian representatives of the species have the same contrasted UNS but the dark postdiscal spots in UNH spaces 4–5 are of the normal size (Figs 13–15). They can represent a separate subcpecies but this option needs collected specimens and further consideration.

Prosotas dubiosa indica (Evans, 1925) §. SR: 106\upstream of Kbal Spean, 14.06.2018; ST: 151\Cheum Takong, 6.12.2019.

Prosotas nora ardates (Moore, [1875]) §. Pu: ♂, 97\12 km S O'Som, 21.03.2019. ST: 151\Cheum Takong (a grassy swamp), 6.12.2019 (Fig. 16).

Prosotas sp. ST: 151\Cheum Takong (a grassy swamp), 5.12.2019 (Fig. 19); the same place, 6.12.2019 (Figs 16–18). Normally *P. nora ardates* has UNH spots in spaces 6 and 7 in echelon (Fig. 16), while these two individuals (photograpghed in the same place as a 'normal' one above) have them in line (Figs 16, 19). This character is not

mentioned in literature as diagnostic in *Prosotas* but is often diagnostic elsewhere in Lycaenidae. Gerard Chartier (pers. comm.) has an opinion that this character is not diagnostic and these specimens are also *P. nora ardates*.

Udara sp. Pu: ♂♂, 100\O'Gran, 17.03.2019.

Zizeera karsandra (Moore, 1865) §, SR: ♀, 141\watermelon field (on the open field), 13.06.2018.

Zizina otis sangra (Moore, 1865) §. SR: 128\SW West Baray, 13.12.2019; 129\West Baray, 8.01.2006; 131\Angkor Wat, 8.01.2006.

Nymphalidae

Danainae

**Danaus chrysippus chrysippus* (Linnaeus, 1758) §. PV: ♂ (Fig. 42), 146\Phneak Roleuk (in the village), 20.06.2018.

Danaus genutia genutia (Cramer, 1779) §. SR: ♂, ♀, 128\SW West Baray, 13.12.2019; ♂, 143\Kampong Pluk forest, 15.06.2018.

Euploea cf. *algea menetriesi* C. et R. Felder, 1860 §. SR: 2 ♂♂, 109\carvings, 23.02.2019 (photo by N. Priydak). PV: ♂, 148\Cheum Thom, 8.12.2019; ST: 151\Cheum Takong, 6.12.2019; ♂, 160\O'Ta Lao, 27.07.2017.

Euploea core godarti Lucas, 1853 §. SR: ♂, ♀, 135\to Mukh Paen, 3.12.2006. ST: 2 ♂ ♂, 160\O'Ta Lao, 27.07.2017.

Euploea cf. *doubledayi doubledayi* (C. & R. Felder, 1860). SR: 112\2nd bridge, 11.03.2019. Differentiation from *E. eyndhowii* was based on the UNH sumbarginal white streaks having distinct margins and their row not reaching the costa.

Eploea eyndhovii gardineri (Fruhstorfer, 1898) §§. ST: ♀, 151\Cheum Takong, 6.12.2019. 2 ind., 159\open forest brook, 27.07.2016.

Euploea klugii erichsonii (C. et R. Felder, [1865]) §§. SR: 114\upstream of 2nd bridge, 11.03.2019; ♂, 128\SW West Baray, 13.12.2019; 143\Kampong Pluk forest, 15.06.2018.

Euploea cf. *modesta modesta* Butler, 1866 §. ST: 4–5 ♂♂, 160\O'Ta Lao, 27.07.2017.

Figures 42–49. Some Nymphalidae from NW and N Cambodia: **42** – *Danaus chrysippus chrysippus*, ♂, from 146\Phneak Roleuk; 20.06.2018; **43** – *Doleschallia bisaltide continentalis* from 128\SW West Baray, 14.12.2019; **44–45** – *Cirrochroa surya siamensis*, ♂ from 105\Kbal Spean, 14.06.2018 (**44**) and ♀ from 106\upstream of Kbal Spean, 14.06.2018 (**45**); **46–47** – *Athyma ranga obsolescens*, ♂, from 105\Kbal Spean, 14.06.2018 **48–49**; – *Euthalia recta monilis* from 107\Kbal Spean path, ♂ of 6.11.2018 (**48**) and ♀ of 14.05.2018 (**49**). Not to scale.

Euploea mulciber mulciber (Cramer, 1777) §. SR: ♂, 114\upstream of 2nd bridge, 11.03.2019.

Euploea sylvester harrisii C. et R. Felder, [1865] §. Pu: ♂, 98\9 km S O'Som, 21.03.2019. PV: ♂, 148\Cheum Thom, 8.12.2019.

Ideopsis similis persimilis (Moore, 1879) §. SR: 3 individuals (Figs 50–52), 135\to Mukh Paen, 13.12.2006; 142\Kampong Pluk scrub, 2.11.2018; 143\Kampong Pluk forest, 15.06.2018. Found only in scrub at the Lake Tonle Sap bank. Ideopsis sp. - SR: 2 individuals, 135\to Mukh Paen, 13.12.2006 (Figs 53–54). I am uncertain if these two photographed at the same bush with flowering of *Merremia hederacea* where the doubtless *I. similis* were also fliong were *I. similis* or *Ideopsis vulgaris* (Butler, 1874); as one of them has a deeply incised cell-end bar (Fig. 53), considered to be diagnostic for *I. vulgaris* (Ek-Amnuay, 2006) while the second had either no incision or the upper part of the spot completely reduced (Fig. 54). *I. vulgaris* was found apart from the lake, at West Baray and on the Phnom Kulen Plateau (see below), where is doubtless (a deeply incised UPS cell-end barl darker UNS ground colour).

Ideopsis vulgaris contigua Talbot, 1939 §. SR: 128\SW West Baray, 13.12.2019; 108\upstream of carvings, 23.02.2017.

Parantica aglea melanoides Moore, 1883 §. SR: ♀, 116\Dameri Krab, 30.06.2018; 2 ♀♀, 120\cashew, 10.03.2019.

Biblidinae

Ariadne merione tapestrina (Moore,1884) §. ST: 160\O'Ta Lao, 27.07.2017.

Cyrestinae

Cyrestis cocles cocles (Fabricius, 1787) §§. SR: ♂, 105\Kbal Spean, 6.11.2018; 107\Kbal Spean path, 6.11.2018; 112\2nd bridge, 12.06.2018.

Cyrestis thyodamas thyodamas Doyere, [1840] §. Pu: ♂, 101\O'Gran brink, 17.03.2019.

Heliconiinae

Acraea terpsicore (Linnaeus, 1758) §. SR: 137\Phnom Krom, 18.06.2018.

Cethosia cyane euanthes (Fruhstorfer, 1912) §. SR: ♂, 128\SW West Baray, 13.12.2019. ST: ♀, 155\Thala Barivat, 19.06.2018.

**Cirrochroa surya siamensis* Fruhstorfer, 1906 §. SR: ♂ (Fig. 44), 105\Kbal Spean, 14.06.2018; ♀ (Fig. 45), 106\upstream of Kbal Spean, 14.06.2018. The male is somewhat abnormal as it had relatively small wings and exhibited a strange behaviour, resembling that of *Algia fasciata* (Felder et Felder, 1860) of crawling erratically with many quick turns (Fig 44). I even suspected its having some developmental anomalies or even being a *Cirrochroa* × *Algia* hybrid. Its identification is based on a distinct and unjagged postdiscal lines but is still tentative as it does not fit too well to the species' general appearance. The female photographed on the same day at a different part of the same valley differed from *C. tyche* (see below) by smaller size and UPS more reddish, with a distinct, moderately jagged discal line and more expressed UPF dark borders.

Cirrochroa tyche mithila Moore, 1872 §. SR: ♀, 107\Kbal Spean path, 6.11.2018; ♀, 105\Kbal Spean, 14.06.2018; ♂, the same place, 6.11.2018; ♀, 106\upstream of Kbal Spean, 14.06.2018; ♂, 108\upstream of carvings, 23.02.2017; 2 ♂, 110\Kulen Waterfall, 12.08.2018; ♂, ♀, 116\Dameri Krab, 30.06.2018; ♂, 132\Banteay Kdel, 22.02.2017. ST: ♀, 158\evergreen forest rivulet, 29.07.2016.

Cupha erymanthis erymanthis (Drury, [1773]) §. SR: 106\upstream of Kbal Spean, 6.11.2018. ST: 150\Spong, 7.12.2019.

Phalanta phalantha phalantha (Drury, 1773) §. SR: ♂, 128\SW West Baray, 14.12.2019.

Terinos terpander intermedia Godfrey, 1916 §§. PV: 146\Phneak Roleuk, 20.06.2018; 148\Cheum Thom, 8.12.2019.

Nymphalinae

**Doleschallia bisaltide continentalis* Fruhstorfer, 1899 §§. SR: 128\SW West Baray, 14.12.2019 (Fig. 43).

Hypolymnas bolina bolina (Linnaeus, 1758) §. SR: ♀, f. *incommoda*, 128\SW West Baray, 1.11.2018; the same place, 13.12.2019; ♂, WF1, 13.06.2018; 2 ♂♂, 143\Kampong Pluk forest, 15.06.2018; ♂, 114\upstream of 2nd bridge, 11.03.2019.

Junonia almana almana (Linnaeus, 1758) §. SR: 128\SW West Baray, 13.12.2019; 3 ind., 139\Aero Angkor, 22.02.2017; 142\Kampong Pluk scrub, 2.11.2018. ST: 153\Karst hill, 26.07.2016; 159\open forest brook, 27.07.2016.

Junonia atlites atlites (Linnaeus, 1763) §. SR: 128\SW West Baray, 14.12.2019; 129\West Baray, 8.01.2006; 3 ind., 135\to Mukh Paen, 13.12.2019; 139\Aero Angkor, 22.02.2017; 142\Kampong Pluk scrub, 2.11.2018.

Junonia hierta hierta (Fabricius, 1798) §. SR: ♂, 131\Angkor Wat, 08.01.2006.

Junonia iphita iphita (Cramer, 1779) §§. PV: 149\Spong Rivulet, 7.12.2019.

Junonia lemonias lemonias (Linnaeus, 1758) §. SR: 122\Tnal Dach, 28.11.2019. ST: 152\Anlung Chhrey, 26.07.2016; 156\Srae Ruessei, 28.07.2017.

Kallima inachus siamensis Fruhstorfer, 1912 §§. Pu: ♀, 101\O'Gran brink, 17.03.2019. ST: 154\grassy brook, 29.03.2016.

Kaniska canace canace (Linnaeus, 1763) §§. SR: 122\Tnal Dach, 29.11.2019.

Yoma sabina vasuki Doherty, [1886] §§. PV: 150\Spong, 7.12.2019.

Limenitinae

Athyma perius perius (Linnaeus, 1758) §. SR: 104\Peung Tanon brook, 11.12.2019; 119\Tnal Mareh, 29.11.2019; 122\Tnal Dach, 29.11.2019.

**Athyma ranga obsolescens* (Fruhstorfer, 1906) §§. SR: ♂ (Figs 46–47), 105\Kbal Spean, 14.06.2018.

Cynitia lepidea cognata Moore, [1897] §§. Pu: ♀, 97\12 km S O'Som, 21.03.2019; ♂, 98\9 km S O'Som, 21.03.2019. SR: ♂, 109\carvings, 23.02.2017; ♂, 126\Ben Melaea, 27.02.2017; ♂, 132\Banteay Kdel, 22.02.2017. PV: ♂, 149\Spong Rivulet, 7.12.2019.

Euthalia aconthea garuda (Moore, 1858) §. SR: ♂, 110\Kulen Waterfall, 30.06.2018; ♀, 112\2nd bridge, 30.06.2018; ♀, 121\Anlong Thom, 29.11.2018; ♂, 133\Sra Srang, 22.02.2017.

Euthalia anosia anosia (Moore, [1858]) §§. SR: ♀, 122\Tnal Dach, 28.11.2019.

Euthalia monina kesava (Moore, 1857) §§§. SR: ♂, 107\Kbal Spean path (below the slope, at the checkpoint), 6.11.2018.

**Euthalia recta monilis* Fruhstorder, 1913 §§. SR: ♂, ♀ (Fig. 49), 107\Kbal Spean path, 14.06.2018; ♂ (Fig. 50), the same place but below the slope, at the checkpoint, 6.11.2018.

Lebadea martha martha (Fabricius, 1787) §. SR: ♀, 117\to Damrei Sras, 30.06.2018; ♂, 122\Tnal Dach, 28.11.2019; ♂, 127\Siem Reap River, 12.02.2017; ♂, 128\SW West Baray, 13.12.2019; ♂, the same place, 14.12.2019; ♂, 132\Banteay Kdel, 22.02.2017. PV: ♂, 149\Spong Rivulet, 7.12.2019; ♂, ♀, 151\Cheum Takong, 6.12.2019.

Lexias albopunctata albopunctata (Crowley, 1895) §§§. Pu: ♀, 98\9 km S O'Som, 21.03.2019. SR: ♀, 108\upstream of carvings, 23.02.2017; 1 ♂, 1 ♀, 109\carvings, 23.02.2017; ♂, 132\Banteay Kdel, 22.02.2017. PV: ♂, 150\Spong, 7.12.2019.

Lexias pardalis jadeitina (Fruhstorfer, 1913) §. Pu: ♀, 100\O'Gran, 18.03.2019. SR: ♂, 105\Kbal Spean, 6.11.2018; ♂, 109\carvings, 23.02.2017; ♀, 117\to Damrei Sras, 30.06.2018; 2 ♂, 126\Ben Melaea, 27.02.2017; ♀, 132\Banteay Kdel, 22.02.2017. PV: ♂, 149\Spong Rivulet, 7.12.2019; ST: ♀, 150\Spong, 7.12.2019; ♂, 151\Cheum Takong, 6.12.2019.

Moduza procris procris Cramer, 1777 §. SR: 126\Ben Melaea (at a small pond overgrown with *Pistia stratiotes*), 27.02.2017. ST: 162\Phnom Preahkonkha, 31.07.2016.

Neptis hylas kamarupa Moore, 1875 §. SR: 106\upstream of Kbal Spean, 14.06.2018; 121\Anlong Thom, 29.11.2019; 126\Ben Melaea, 27.02.2017; 128\SW West Baray, 5.11.2018; the same place, 14.12.2019; 2 ind., 132\Banteay Kdel, 22.02.2017. PV: 146\Phneak Roleuk, 20.06.2018; 150\Spong, 7.12.2019; 149\Spong Rivulet, 7.12.2019. ST: 155\Thala Barivat, 29.07.2016.

Pantoporia hordonia hordonia (Stoll, 1790) §§. PV: 147\SE Phneak Roleuk, 6.12.2019.

Pantoporia paraka paraka (Butler, [1879]) §§. ST: 151\Cheum Takong, 6.12.2019.

Pantoporia sandaka davidsoni Eliot, 1969 §§. SR: 110\Kulen Waterfall, 30.06.2018; 121\Anlong Thom, 10.03.2019. PV: 149\Spong Rivulet, 7.12.2019; ST: 151\Cheum Takong, 6.12.2019.

Phaedyma columella martabana (Moore, 1881) §. SR: ♀, 110\Kulen Waterfall, 10.03.2019; 2 ♂♂, 136\Phnom Krom swamp, 18.06.2018; ♂, 141\watermelon field, 13.06.2018; 2 ♂♂, 143\Kampong Pluk forest, 24.02.2017; 3 ♂♂, 2 ♀♀, the same place, 15.06.2018. ST: 150\Spong, 7.12.2019.

Parthenos sylvia apicalis Moore, [1879] §§. SR: 106\upstream of Kbal Spean, 14.06.2018; 121\Anlong Thom, 29.11.2019.

Tanaecia jahnu (Moore, [1858]) §§. Pu: ♀, 98\9 km S O'Som, 21.03.2019. SR: ♂, ♀, 107\Kbal Spean path, 14.06.2018; ♀, the same place (below the slope, at the checkpoint), 6.11.2018. PV: ♀, 149\Spong Rivulet, 7.12.2019.

Tanaecia julii odilina (Fruhstorfer, 1913) §§. SR: ♂, ♀, 106\upstream of Kbal Spean, 6.11.2018; ♀, 107\Kbal Spean path, 14.06.2018; ♀, the same place, 6.11.2018; ♂, 109\carvings, 23.02.2017; ♀, 110\Kulen Waterfall, 10.03.2019; ♀, 112\2nd bridge, 4.11.2018; ♀, 127\Siem Reap River, 3.11.2018. ST: ♀, 151\Cheum Takong, 6.12.2019.

Figures 50–54. Five different individuals of *Ideopsis similis persimilis* (**50–52**) and *Ideopsis* sp. (**53–54**), most probably the same species, photographed simultaneously at the same bush with flowering *Merremia hederacea* near trees on the bank of a small water reserve at 135\to Mukh Paen, 13.12.2006. Not to scale.

Apaturinae

Euripus nyctelius nyctelius (Doubleday, 1845) §. PV: ♂, 144\Tbeng Meancheay, 19.06.2018.

Charaxinae

Charaxes cf. *bernardus hierax* C. & R. Felder, [1867] §. ST: ♂, 150\Spong, 7.12.2019.

Amathusinae

Amathuxidia amythaon annamensis Talbot, 1932 §§. SR: 112\2nd bridge, 4.11.2018.

Melanocyma faunula kimurai Saitoh, 2003 §§. Pu: ♀, 100\O'Gran, 16.03.2019.

Figures 55–64. Some Hesperiidae from Cambodia: **55–56** – *Burara oedipodea belesis*, ♂, from 135\to Mukh Paen, 3.12.2019; **57** – *Hasora chromus chromus* from 157\spiny bamboo river, 28.07.2016; **58** – *Pseudocoladenia dan dhyana* from 108\upstream of carvings, 11.06.2018;

Stichophthalma cambodia (Hewitson, [1862]) §§§. Pu: ♀, 102\Tumpor slope, 15.03.2019; ♀, 100\O'Gran, 15.03.2019; ♀, the same place, 16.03.2019.

Thaumantis diores splendens Tytler, 1939 §§. Pu: ♂, 100\O'Gran, 16.03.2019.

Satyrinae

Elymnias hypermnestra tinctoria Moore, 1879 §. SR: ♀, 129\West Baray, 8.01.2006 PV: ♂, 149\Spong Rivulet, 7.12.2019.

Lethe chandica suvarna Fruhstorfer, 1908 §§. Pu: 101\O'Gran brink, 17–18.03.2019.

Lethe confusa confusa Aurivillius, [1898] §. Pu: 101\ O'Gran brink, 17.03.2019.

Lethe europa niladana Fruhstorfer, 1911 §§. SR: ♂, 138\Damnak Riverside, 14.12.2019.

Melanitis leda leda (Linnaeus, 1758) §. SR: 138\Damnak Riverside, 3.12.2019.

Melanitis spp. SR: 126\Ben Melaea, 27.02.2017; 128\SW West Baray, 14.12.2019; 138\Damnak Riverside, 27.11.2019; 142\Kampong Pluk scrub, 2.11.2018. PV: 147\SE Phneak Roleuk, 21.06.2018. ST: 161\Anlung Chheuteal, 31.07.2016.

Mycalesis spp. Pu: 97\12 km S O'Som, 21.03.2019. SR: 14.12.2019; 107\Kbal Spean path, 6.11.2018; 121\Anlong Thom, 29.11.2019; 128\SW West Baray, 129\West Baray, 8.01.2006. PV: 149\Spong Rivulet, 7.12.2019; ST: 151\Cheum Takong, 5–6.12.2019; 156\Srae Ruessei, 28.07.2016; ♂, ♀, 163\Kampong Preah, 1.08.2016.

Orsotriaena medus medus (Fabricius, 1775) §. SR: ♂, ♀, 108\upstream of carvings, 23.02.2017. ST: 151\Cheum Takong, 5.12.2019.

Penthema darlisa mimetica Lathy, 1900 §§§. Pu: ♂, 97\12 km S O'Som, 21.03.2019; ♂, 98\9 km S O'Som, 21.03.2019.

Ragadia crisilda Hewitson (1862) ssp. §§. Pu: 100\O'Gran, 17.03.2019.

Figures 55–64. (Continued) 59 – *Koruthaialos* cf. *sindu sindu* from 98\9 km S O'Som, 21.03.2019; **60–61** – *Parnara ganga* from 128\SW West Baray, 14.12.2019; 98\9 km S O'Som, 21.03.2019; **62** – Hesperiinae indet. 1 (?*Baoris oceia* or ?*Caltoris chaira*) from 110\Kulen Waterfall, 12.06.2018; **63** – Hesperiinae indet. 2 (?*Pemara pugnans*) from 161\Anlung Chheuteal, 31.07.2016; **64** – *Borbo cinnara* from 95\Buu Sraa Waterfall, Mondulkiri Province, misidentified in Kosterin (2019b: fig. 43). Not to scale.

Ypthima spp. SR: 128\SW West Baray, 5.11.2018; ♂, 114\upstream of 2nd bridge, 30.11.2019. ST: ♂♂, ♀, 151\Cheum Takong, 5–6.12.2019.

Hesperiidae

Coeliadinae

Badamia exclamationis (Fabricius, 1775) §. SR: ♂, 135\to Mukh Paen, 3.12.2006; 140\scrub, 5.11.2018. ST: 158\evergreen forest rivulet, 29.07.2016; 163\Kampong Preah, 31.07.2016.

**Burara oedipodea belesis* (Mabille, 1876) §§. SR: ♂ (Fig. 55–56), 135\to Mukh Paen, 3.12.2019.

**Hasora chromus chromus* (Cramer, [1870]) §. ST: 157\spiny bamboo river, 28.07.2016 (Fig. 57).

Hasora proxissima siamica Evans, 1932 §§ - ST: 150\Spong (in the village), 7.12.2019. On down, at 6:30–7 a.m., of at least three consequent mornings, 7–9.12.2019, most probably the same individual appeared at the open ground floor of a very big house, flew and sat on walls and the ground. When resting it repeatedly curved its abdomen and touched the substrate with its tip. I was uncertain about the sex of this individual.

Pyrginae

Caprona alida alida (de Niceville, 1891) §§§. SR: 124\Ta Penh, 10.03.2019.

Odontoptilum angulatum angulatum (C. Felder, 1862) §. SR: 121\Anlong Thom, 10.03.2019.

**Pseudocoladenia dan dhyana* (Fruhstorfer, 1909) §. SR: 108\upstream of carvings, 11.06.2018 (Fig. 58).

Tagiades japetus ravi (Moore, 1866) §§. PV: 148\Cheum Thom, 8.12.2019; 149\Spong Rivulet. 7.12.2019; ST: 151\Cheum Takong, 6.12.2019.

Hesperiinae

Ampittia dioscorides camertes (Hewiston, 1868) §. SR: ♂, ♀, 122\Tnal Dach, 28.11.2019.

Ancistroides nigrita maura (Snellen [1880]) §. SR: 110\Kulen Waterfall, 4.11.2018.

Pelopidas cf. *mathias mathias* (Fabricius, 1798) §. SR: (several ind.), 142\Kampong Pluk scrub, 2.11.2018. UPS not seen, another, less probable option could be *P. subochraceus barneyi* (Evans, 1937).

Hyarotis adrastus praba (Moore, 1860) §§. ST: 156\Srae Ruessei, 28.07.2016; 2 ind., 158\evergreen forest rivulet, 29.07.2016.

Iambrix salsala salsala (Moore, [1866]) §. SR: 108\upstream of carvings, 5.11.2018; 122\Tnal Dach, 28.11.2019; 128\SW West Baray, 5.11.2018. PV: ♂, ♀, 149\Spong Rivulet, 7.12.2019; ST: 151\Cheum Takong, 5.12.2019; ♀, the same place, 6.12.2019.

**Koruthaialos* cf. *sindu sindu* (Felder & Felder, 1860) §§§. Pu: 98\9 km S O'Som, 21.03.2019 (Fig. 59). Tentatively differentiated from *K. rubecula* (Plötz, 1882) by short (last segment of) palpi (Ek-Amnuay, 2006).

Matapa aria (Moore, 1866) §. SR: 128\SW West Baray, 25.02.2017.

Notocrypta curvifascia curvifascia (C. et R. Felder, 1862) §. SR: 112\2nd bridge, 4.11.2018; 119\Tnal Mareh, 29.11.2019.

Notocrypta paralysos asawa Fruhstorher, 1911 §. SR: 113\Kulen brook, 11.03.2019; PV: 149\Spong Rivulet, 7.12.2019.

**Parnara ganga* Evans, 1837 §. 128\SW West Baray, 14.12.2019 (Figs 60–61). Identified by relatively large white spots versus much smaller in similar species.

Pirdana hyela rudolphii Elwes & de Nicéville, 1887 §§§. SR: 108\upstream of carvings, 13.12.2019.

Potanthus spp. - Pu: 97\12 km S O'Som, 21.03.2019. SR: 142\Kampong Pluk scrub, 2.11.2018; PV: (2 diferent species) 149\Spong Rivulet, 7.12.2019.

Psolos fuligo subfasciatus (Moore, 1879) §. SR: 2 ind., 132\Banteay Kdel, 22.02.2017. PV: 149\Spong Rivulet, 7.12.2019.

Suastus gremius gremius (Fabricius, 1798) §. SR: 128\SW West Baray, 13.12.2019. ST: 156\Srae Ruessei, 28.07.2016.

Telicota sp. SR: 143\Kampong Pluk forest, 15.06.2018.

Udaspes folus (Cramer, 1775) §§. PV: 146\Phneak Roleuk, 20.06.2018. ST: 163\Kampong Preah, 31.07.2016; the same place, 1.08.2016.

Hesperiinae indet. 1: ?*Baoris oceia* (Hewitson, [1868]) §. SR: 110\Kulen Waterfall, 12.06.2018 (Fig. 62). A bad photo and a difficult group of Hesperiinae. However the two small isolated cell end spots of the same size, absence of the spot in space 5, general disposition of spots (Fig. 62) would lead to a choice of either *Baoris oceia* or *Caltoris cahira austeni* (Moore, [1884]), both not yet reported for Cambodia, or to a less resembling (the UNS spot in space 3 not so vertical) *Caltoris cormasa* (Hewiston, 1876).

Hesperiinae indet. 2: ?*Pemara pugnans* (de Nicéville, 1891) §§. ST: 161\Anlung Chheuteal, 31.07.2016 (Fig. 63). Although little is seen, the following characters suggest the mentioned species: no UNH pale spots, the UPH upper end-cell spot long and not conjoined to the spot below (Fig. 63).

Corrigenda to the two previous communications of this series

Gerard Chartier (pers. comm.) kindly pointed at some my erroneous identifications in the previous communications of this series (Kosterin 2019a, b).

The photo misidentified as *Arhopala aedias meritatas* Corber, 1941 in Kosterin (2019a: fig. 13) from 28\'Viola Veal' in fact shows *Arhopala camdana* Corbet, 1941 ssp.: no spot at the base of the UNF space, the UNF and UNH cell end bars with bulging outer margins. Besides, according to the field notes, this butterfly had pale blue UPS, that also fits *A. camdana* rather than *A. aedias*. So *A. aedias* is not currently known from Cambodia, while *A. camdana* is recorded for Cambodia by Chartier (2020) but the record is not published in literature.

The photo misidentified as *Nacaduba* cf. *berenice aphya* (Fruhstorfer, 1916) in Kosterin (2019a: fig. 32) from 30\'Microgomphus River' in fact shows *Ionolyce helicon merguiana* (Moore, 1882) (photographed in the same place and date and mentioned in the same paper): the HW termen is nearly straight from mid-space 2 to vein 6 and the UNF costa misses white strokes above the subbasal white lines in the cell, that are the characters of *I. helicon* (Seki et al. 1991). I was misled by an oblique angle of view plus the butterfly was most probably a female.

The photo identified as *Notocrypta clavata theba* (Evans, 1949) in the same paper (Kosterin 2019a: fig. 74) was most probably misidentified as well and actually shows the common *N. paralysos*, since the continuation of the UPS white band to the costa is weak on UNF and not at all expressed in UPF, and there is a trace of the white subapical spot on UPS. *N. clavata* is recorded for Cambodia by Chartier (2020) but the record is not published yet in literature.

I have to correct a misidentification of actually *Borbo cinnara* (Wallace, 1866) from 95\Buu Sraa Waterfall as "*Pelopides* cf. *mathias*" in (Kosterin 2019b: fig. 43): there is no UNH cell spot; UnF cell spots are pointing almost at the tornus, while to mid-dorsum in *P. mathias*; UPS ground colour is darker (Fig. 64; reproduced from Kosterin 2019b: fig. 43). It should be noted that *B. cinnara* has also not yet been reported for Cambodia in literature but its Cambodian photos by Chartier (2020) and Dani Jump (the Facebook group 'Bees unlimited') are present in Internet.

Kosterin (2019a) reported (but not illustrated) two species of *Eurema* for loc. 17\Capricornis Rivulet: *E. sari sodalis* (Moore, 1887) and *E. hecabe hecabe*. A thorough reconsideration of the photographs of that big butterfly puddle revealed two individuals of *E. sari*, no any individual of *E. hecabe* but, in addition, *E. andersoni sadanobui* and *E. blanda silhetana* (Wallace, 1867) (one individual each).

Discussion

This paper reports 162 identified and 13 provisionally identified species (175 in total), although the distinction is vague. As many as 22 species (*Miletus ancon*, *Arhopala agrata*, *A. alesia*, *A. allata*, *A. ammonides*, *A. atrax*, *A. aurelia*, *A. moolaiana*, *A. silhetensis*, *Drupadia theda*, *Anthene licates*, *Prosotas aluta*, *Danaus chrysippus*, *Cirrochroa surya*, *Doleschallia bisaltide*, *Athyma ranga*, *Euthalia recta*, *Burara oedipodea*, *Hasora chromus*, *Pseudocoladenia dan*, *Borbo cinnara*, *Koruthalaios sindu*, *Parnara ganga*) are reported for Cambodia for the first time in scientific literature. Two dubious photos probably show *Baoris oceia* and *Pemara pugnans*, also not yet reported for this country. It should be noted that Cambodian photos of quite a number of these species already exist in internet, as is acknowledged in the Cambodian checklist (Chartier and Kosterin 2020): *A. agrata*, *A. silhetensis*, *D. theda*, *A. licates*, *A. ranga*, *H. chromus* by Gerard Chartier at his site of butterflies of Tatai Commune of Koh Kong Province (Chartier 2020); *M. ancon*, *A. atrax*, *D. theda*, *D. chrysippus*, *D. bisaltide*, *A. ranga*, *E. recta*, *H. chromus*, *P. ganga* by Eddie Smith (Siem Reap) uploaded to the Facebook group 'Natural Cambodia'; *P. aluta*, *D. bisaltide*, *A. ranga*, *E. recta* by Dani Jump (Siem Reap) in his facebook group 'Bees unlimited'.

D. chrisippus is common in Cambodia and surely escaped recording until now because of lack of attention for that reason (but was mentioned verbally in the first communication of this series (Kosterin 2019a). *M. ancon*, *A. agrata*, *A. alesia*, *A. allata*, *A. ammonides*, *A. atrax*, *A. licates*, *K. sindu*, and *P. ganga* were estimated by Ek-Amnuay (2006) as rare in the neighbouring Thailand, *A. auerlia*, *A. moolaiana*, *D. theda*, *D. bisaltide*, *A. ranga*, *E. recta*, and *B. oedipodea* as uncommon and *A. silhetana*, *P. aluta*, *C. surya*, *H. chromus*, *P. dan* and *B. cinnara* as common.

Of localities where pristine evergreen forest is preserved, the richest one was the Kbal Spean vicinities (locs 105–107) at the eastern side of the western Plateau of Phnom Kulen Mts., where I found 39 species for two days of observations. Of localities with moderably disturbed natural vegetation, the richest place was in the vicinity of the Spong village (locs. 149–150) inside the vast Prey Long lowland rainforest, where I found the same number of 39 species for one day. There patchy clearead areas provide a lot of sunny forest margins which is a favourable place if not for butterfly habitation but at least for observation of them. Among secondary habitats affected by human activity for not less than a thousand years, the very narrow strips of open dry forest and long fallow lands on small glades between the walls of West Baray at its SE corner and the vast lotus swamps, in the western vicinity of Siem

Reap City (locs 128–129), appeared an unexpectedly rich locality in spite of its poor appearance. Although missing rare species, at any season this place provides a great diversity of butterflies common in Indochina. In total I found as many as 42 species there. (This is in a curious contrast to the walls themselves, also bearing arboreal vegetation, and the the banks of the reservoir, which are fairly poor.)

The periodically inundated banks of Lake Tonle Sap offer unique vast communities of temporarily flooded forest and scrub, where some unusual butterfly species could be expected. Although there are indeed species which seem to be more frequent there than elsewhere, e.g. *P. columella* and *B. exclamationis*, only two species, *I. similis* and *P. aluta*, were repeatedly found only in temporarily flooded scrub and are probably confined to it.

The Phnom Tumpor Mt. (locs 100–102) resides in the Phom Samkos Wildlife Sanctuary and so was earlier specially studied with respect to its butterfly fauna by Monastyrskii et al. (2011) in 2006 and 2010. Such species as *P. corvus*, *K. inachus*, *T. diores*, *L. chandica* and *L. confusa*, observed on the Phnom Tumpor were not found specifically on this mountain by Monastyrskii et al. (2011), although were reported for Phnom Kmoach Mt in the same sanctuary, while *L. pardalis* was not reported for the sanctuary as a whole.

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